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By G. H. Cunningham,
Mycologist, Department of Agriculture, Wellington, New Zealand.

[*Read before the Wellington Philosophical Society, 16th March, 1927; received by Editor, 21st June and 21st August, 1927; issued separately, 18th October, 1927.*]

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(Plates 21-24.)

Under the sub-class Hymenomycetes of the Basidiomycetes occur a natural group of Fungi (the Polyporaceae) characterised in that the hymenium lines hollow tubes or pits on the (usually) ventral surface of the fructification. But as to whether this group constitutes an order, family or tribe of the Hymenomycetes, no unanimity of opinion exists. A brief outline of several of the classifications published, will illustrate these differences of opinions held by different Mycologists.

The first definite classification published on the group was that of Fries (15), in which the known Polypores of that period were arranged in sequence. This work was established as the starting-point of modern nomenclature in the Hymenomycetes, at the Nomenclature Conference, held at Brussels in 1910. Papers published prior to 1821, are therefore only of historical interest, so need not be further referred to.

Fries in 1821 (15, vol. 1) divided the Polyporaceae into two genera, *Daedalea* and *Polyporus*. The latter was again divided into the three sub-genera Favolus, Microporus and Polysticta; and each sub-genus was further subdivided into the following five tribes:—

Mesopus—pileus centrally stipitate.
Pleuropus—pileus laterally stipitate.
Merisma—pilei imbricated, laterally stipitate and branched.
Apus—pilei dimidiate sessile or effused.
Resupinatus—resupinate forms.

On the consistency of the tubes, each tribe was further split into the sections Carnosi, Sub-carnosi, Suberosi, Sub-suberosi, etc.

In 1828 (16, p. 44) Fries recognized *Favolus* as a distinct genus.

In 1836 (17) he separated the genus *Trametes* from *Daedalea* as a distinct genus and recognized *Cyclomyces* and *Hexagonia* as valid genera.

In 1838 (18) he further subdivided the sessile species on the nature of the upper surface of the pileus and longevity of the plant into:—

Anodermei—without cuticle, fleshy, annual.
Placodermei—hard crust, perennial.
Inodermei—thin fibrous cuticle, biennial.

In 1851 (19) he divided the genus *Polyporus* into three sub-genera:—

Eupolyporus—annual, fleshy, tough species.
Fomes—perennial species with stratose tubes.
Poria—resupinate forms.

and separated *Polystictus* as a distinct genus on account of the coriaceous pileus, fibrous cuticle and homogeneous hymenium.

Thus in all his publications, Fries recognizes only seven genera, namely *Cyclomyces, Daedalea, Favolus, Hexagonia, Polyporus, Polystictus* and *Trametes.*

A related group of fungi, containing plants with the hymenium lining tubes, but differing in the nature of the context, evanescent nature and different development was in 1821 (15) separated by Fries as a distinct family, the Boletaceae.

Gillet (20) recognized all those genera proposed by Fries save *Polystictus,* and in addition erected the genera *Fomes, Merisma* and *Physisporus* to contain woody perennial forms, branched stipitate forms and resupinate forms respectively.

Quelet (31) raised the eleven divisions of *Polyporus* outlined by Fries into genera, eleven in all. The other Friesian genera were retained without alteration.

Saccardo (33) followed the arrangement proposed by Fries.

The next important classification to appear was that in the Natuerlichen Pflanzenfamilien (22), in which the sub-class Hymenomycetes was divided by Hennings into six orders, one being the Polyporaceae, containing the tribes Merulieae, Polyporeae, Fistulineae, and Boleteae. Twelve genera were included in the Polyporeae, including *Lenzites,* included by earlier workers in the Agaricaceae.

In 1907-1908, Murill (28) published a classification of the North American Polyporaceae. In this he considered no less than seventy-eight genera, placed under four tribes Porieae, Polyporeae, Fomiteae and Daedaleae. This large number of genera necessitated his considering characters not likely to be regarded as being of generic value by other workers, as colour and texture of the context and pores, colour of the spores, and the like.

The most recent classification to date is that of Rea (32). Under the order Aphyllophorales (sub-order Porohydnineae) are placed the families Polyporaceae, Polystictaceae, Meruliaceae, Fistulinaceae, Hydnaceae, Thelephoraceae and Cyphellaceae. The Polyporaceae and Polystictaceae each contain five genera, the former *Polyporus, Sistotrema, Fomes, Ganoderma* and *Poria*; the latter *Polystictus, Irpex, Lenzites, Trametes* and *Daedalea.* The Boletaceae is placed under the sub-order Boletineae of the order Agaricales.

When these diverse classifications are considered it becomes obvious that the difficulty confronting the student is to decide which is the most suitable. For all have their advantages, and their disadvantages. The tendency on the one hand is to retain few genera, but to group these under numerous families—in other words, to show that their relationships are distant, not close; on the other hand to erect numerous genera on slight and often inconstant characters, but to maintain these under small groups, as tribes and the like. Another disadvantage of certain of the modern classifications, is their complicated nature; for when complicated they tend to defeat the chief object of the systematist—to present the species of his region in such a manner that they shall be readily known.

After working over the New Zealand material, and abundant specimens from abroad, the writer is of the opinion that it is not practicible to maintain more genera than were accepted by Fries and certain other workers of his period. For it appears clear, to the writer at least, that Fries had already used all characters that may be considered of generic value; and a further multiplication of genera based on insufficient constancy of characters would only lead to confusion.

The genera present in New Zealand, the writer would arrange under the two tribes Polyporeae and Merulieae. These he would place under the family Polyporaceae, in turn placed under the order Polyporales, together with the Boletaceae. This arrangement may yet have to be modified, when the structure and development of the Boletaceae are more fully studied. Meanwhile the writer believes this family should be grouped with the Polyporaceae under the same order, on account of the fact that, in both, the hymenium lines definite tubes on the ventral surface of the pileus.

## Generic and Specific Characters.

Earlier workers used as a basis for classification, such characters as were readily noticeable, as the configuration of the lower surface of the pileus (whether gill-like, daedaloid, irpiciform or poroid), nature of the context, whether woody, coriaceous, fleshy or gelatinous, nature of the surface of the pileus, whether with or without a crust, hard or soft, smooth or zoned, etc.; whether the tubes formed a solitary layer or were in strata. These characters were for the most part fixed upon first by Fries, and accepted completely or in part by later workers.

Certain later workers have contended that certain of these genera (as *Fomes, Polyporus*) were too large, and contained too many species, and have attempted to modify the existing arrangement in various ways. One of the first to engage in such work was Quelet (31), who raised to genera, such sections of *Polyporus* as Fries had previously delimited. Others, working on colour and nature of the context, etc., colour and surface markings of the spores, have split two or three of the original genera into many—the climax having been reached by Murill (28) who recognized no less than 78 genera. Karsten (24), Patouillard (30), and more recently Lazaro (25) have also erected many genera on similar characters. It is significant that although several have been engaged in erecting numerous genera, few of these have been accepted by others engaged in similar work. Some idea as to the confusion this class of work has introduced into the literature, may be gained by a perusal of the synonymic list under the genus *Polyporus*, where almost 100 generic synonyms are listed.

The reason why close splitting of genera of the Polyporaceae cannot be adopted lies in the fact that so few characters are constant in this group. For example, with species typically stipitate, the stipe may be lateral or absent, or the plant may even be resupinate. The crust on the surface (used as a group character by certain work-

ers) may be strongly developed or wanting from different plants of the same collection.

Of recent years some attention has been paid to such microscopic characters as the colour of the spores, the nature of their surface markings, presence or absence or setae in the hymenium, and even the nature of the hyphae of which the pileus is composed.

The spores are certainly constant in all species examined by the writer, especially in colour and surface markings, and serve as admirable specific characters. But unfortunately in the majority of species, the spores are hyaline and smooth, being usually so regularly of a similar type as to be of little value generically; and so many plants are known in which they have not been found, as to invalidate their use for generic delimitation. Further, when spores are scanty in a specimen (usually the case with hyaline-spored species, irrespective of genera), when found they cannot be considered as belonging to that species, unless found attached to basidia. And if so found, it is often possible they may be immature, when—even if belonging to a rough-spored species—they may appear smooth. Many erroneous spore records have been based on descriptions drawn up of spores of Hyphomycetes growing on old pilei; hence the need for caution in the use of such a character.

Cystidia on the whole are quite useful specific characters, but as not infrequently they may be present or absent in different plants of the same collection (*e.g., Fomes robustus*) it is evident they cannot be considered of generic import.

Examples showing the confusion which has arisen through trying to maintain certain genera are numerous—one excellent illustration being the so-called genus *Polystictus*. Fries separated it from *Polyporus* because the pileus was coriaceous, the cuticle fibrous and the pileus heterogenous—possibly quite sound characters when the few European species he was dealing with are considered, but worthless when applied to the number now known. Rea (32) goes to the extent of separating this and other genera as the family Polystictaceae, separated from the Polyporaceae because the former was supposed to possess a homogeneous hymenium, as opposed to the heterogeneous hymenium of the latter. Other workers have attempted to show that the genus may be segregated by the hairy surface of the pileus, or its sterile margin. But all these conditions occur equally with species placed by workers (including Fries) in *Polyporus*, it is evident that *Polystictus* cannot exist as a genus, or even as a section of *Polyporus*.

Probably the idea (originating with Fries) of splitting genera into named sections has been in part responsible for the flood of "new genera" with which modern literature dealing with the Polyporaceae has been inundated. This serves to bring related species together, provided the correct group characters are chosen, but the characters used too often cannot be considered as being of *generic* value, owing to their variability. Fries, presumably, was quite aware of this fact, otherwise he probably would have erected his sections into genera.

KEY TO THE GENERA.

POLYPORACEAE: Pileus annual or perennial; stipitate, sessile or resupinate; woody, coriaceous or fleshy. Hymenium lining the interior of tubes, shallow pores, or anastomosing plates; tubes sometimes toothed; basidia unicellular, apically sterigmate, tetrasporous; spores continuous, coloured or hyaline, rough or smooth.

Tribe Polyporeae: Hymenium lining coherent tubes, sometimes toothed.
Receptacle pileate.
Tubes entire.
Tubes in strata .... .... .... .... .... 1. *Fomes.*
Tubes not in strata.
Tubes at proximal ends even. .... .... 2. *Polyporus.*
Tubes at proximal ends sunk different depths into context.... .... .... .... 3. *Trametes.*
Tubes torn into teeth. .... .... .... .... 4. *Irpex.*
Receptacle resupinate.
Tubes in strata } .... .... .... .... 5. *Poria.*
Tubes not in strata }
Tribe Merulieae: Hymenium lining fold-like plates anastomosing frequently to form shallow pores 6. *Merulius.*

## 1.—The Genus Fomes.

1. ***Fomes** Gillet, *Champ. Fr.*, vol. 1, p. 682, 1878.
*Ganoderma* Karst., *Rev. Myc.*, vol. 3, p. 17, 1881.
*Fomitopsis* Karst., l.c., p. 18.
*Xylopilus* Karst., *Hattsv.*, vol. 2, p. 69, 1882.
*Placodes* Quel., *Ench. Fung.*, p. 170, 1886.
*Phellinus* Quel., *l.c.*, p. 172.
*Mucronoporus* Ell. et. Ev., *Jour. Myc.*, vol. 5, p. 28, 1889.
*Elfvingia* Karst., *Finl. Basidsv.*, p. 333, 1889.
*Heterobasidion* Bref., *Unters. Gesmmt. Myk.*, vol. 8, p. 154, 1889.
*Ungulina* Pat., *Cat. rais. Pl. cell. Tunisie*, p. 48, 1897.
*Pyropolyporus* Murr., *Bull. Torr. Bot. Cl.*, vol. 30, p. 109, 1903.
*Globifomes* Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 424, 1904.
*Nigrofomes* Murr., *l.c.*, p. 425.
*Fomitella* Murr., *Bull. Torr. Bot. Cl.*, vol. 32, p. 365, 1905.
*Amauroderma* Murr., *l.c.*, p. 366.
*Porodaedalea* Murr., *l.c.*, p. 367.
*Whitfordia* Murr., *Bull. Torr. Bot. Cl.*, vol. 35, p. 47, 1908.
*Hemidiscia* Laz., *Polip. Fl. Espan.*, p. 82, 1917.
*Pseudofomes* Laz., *l.c.*, p. 87.
*Friesia* Laz., *l.c.*, p. 92.
*Ungularia* Laz., *l.c.*, p. 110.
*Mensularia* Laz., *l.c.*, p. 124.
*Scalaria* Laz., *l.c.*, p. 127.
*Boudiera* Laz., *l.c.*, p. 150.

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**Fomes* was not used as a generic name by Fries, though the genus is credited to him in most publications. In 1851 (19) he divided *Polyporus* into the sub-genera Eupolyporus and Fomes, citing species accordingly as Polyporus (Fomes). . . . The sub-genus was raised to generic rank subsequently by Gillet.

Pileus perennial; woody or corky; stipitate, sessile or resupinate; applanate, ungulate or subglobose; exterior anoderm or encrusted, sometimes varnished; context white or coloured; tubes stratose; cystidia present or wanting; spores hyaline or coloured, rough or smooth, continuous.

Habitat: On wood; parasitic or saprophytic.

Distribution: World-wide.

The genus is characterized by the stratose tubes and usual woody habit. In most species the stratose tube are so noticeable as readily to place them in the correct genus; in others—especially in certain tropical species where growth is continuous—they are often poorly defined; and in certain rare cases, as in *Polyporus gilvus* and *P. Braunii*, they occur so seldom as to warrant their appearance being accidental, and therefore justify the placing of such under *Polyporus*.

All New Zealand species are sessile, though a few have lateral stipe-like projections suggesting stipes, but elsewhere occur species with definite central stems. With us, all occur on wood, but in the tropics a few terrestrial forms are known. In the related genus *Poria* are grouped plants with stratose and non-stratose pores. Doubtless most of the stratose "species" are resupinate forms of *Fomes* (and indeed many have already been shown to belong to this genus); but until they have been connected with their pileate forms, they are as a matter of convenience placed under this genus.

*Fomes* has been split into numerous genera by different workers, as the synonomy shows. Most have been ignored by the majority of systematists, but a few have within recent years, come into more or less general use and consequently require further discussion before being dismissed.

*Ganoderma* was erected in 1881 by Karsten (23) as a monotypic genus containing the species *G. lucida*, characterized by the laccate pileus and stipe. Later, on the same characters Quelet erected his genus *Placodes*. Patouillard (29) extended *Ganoderma* to include all species possessing coloured spores, shining, laccate pilei and adhering, stratose, or non-stratose tubes. It is this last character (the stratose or non-stratose tubes) which has caused so much confusion in literature, for naturally it breaks down the only possible division between *Polyporus* and *Fomes*. Later Patouillard (30) separated the species of *Polyporus* and *Fomes* possessing hard, coloured context and divided them into four genera, on the following characters:—

| | |
|---|---|
| Plants with laccate crust. | |
| Spores coloured, truncate .... .... .... .... | *Ganoderma.* |
| Spores hyaline .... .... .... .... .... | *Ungulina.* |
| Plants without a laccate crust. | |
| Spores coloured .... .... .... .... .... | *Xanthochrous.* |
| Spores hyaline .... .... .... .... .... | *Phellinus.* |

Now as in New Zealand in the same species may occur plants with and without this laccate crust, it is obvious that this character cannot be considered as possessing generic value; and as has been shown, spore characters in a group where they are so frequently wanting, cannot be used generically.

*Mucronoporus* was erected for species of *Polyporus, Fomes* and *Poria* possessing strongly developed coloured setae in the hymenium. But these structures may be present or absent in different plants of the same species, so cannot be used generically.

Murrill's genera were for the most part erected on such characters as colour of the context and spores, presence or absence of a stipe, and the like; characters, as has been shown, that are of no value generically. Lazaro (25) appears to have given new generic names to sections already previously named by Karsten, Patouillard and Murrill.

### Structure of the Mature Plant.

As an example, the abundant *Fomes hemitephrus* is chosen, as it may readily be found (in Wellington district at least) throughout the year on fallen beech trunks in the forest; and in addition well illustrates certain peculiarities characteristic of the genus.

The fruit body, termed herein the pileus (but known also as sporophore, receptacle or hymenophore) consists of three distinct structures, the cuticle, context and tubes. It is usually applanate in shape, and is attached to the substratum by a broad, thickened lateral portion often prolonged in certain species into a stem-like structure (c.f. *F. subtornatus*). The surface (cuticle) is covered with a very hard crust, brown or black in colour and appearing like pitch when cut into. It may be even, but more often is zoned. In other species the crust is replaced by a thin, soft and fibrous cuticle. In old specimens the crust is often rimose (broken into small areas by numerous crevices). Beneath the crust lies the flesh, or context as it is here termed (trama of certain workers; medulla of de Bary). In fresh plants it is often snow-white, but in herbarium specimens it ranges from pallid ochre to isabelline. It is usually coloured tawny orange immediately beneath the crust, and on this account the species may be readily recognised. The context is composed of thick-walled, interwoven hyphae.

Attached to the context, on the lower surface of the pileus, lie the strata of tubes, their number depending on the age of the plant. Each tube is in reality a cylindrical cavity in the tissue of the context, which is consequently modified by its presence, especially in the arrangement of the hyphae, and is lined with the hymenium, consisting of basidia and paraphyses. The tubes are so closely compacted as to give the impression that they are in reality separate cylinders; but as it is not possible to dissect them out, their true nature is evident. In certain other genera, as *Boletus* and *Fistulina*, they really are separable from one another, hence the acceptance for the universally used term tube. The basidia are small cylindrical or clavate structures, bearing at their apices four small sterigmata on which in turn are borne the four elliptical, hyaline, smooth spores. In this paper the term hymenium is limited to the layer of basidia, paraphyses and sub-hymenial tissue underlying them; but in most the term is somewhat loosely applied to the whole of the pore strata.

A fresh stratum is formed each growth period, which with this species (in New Zealand at least) occurs twice a year. A white

Face p. 208.

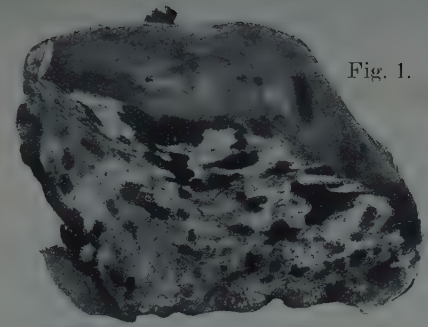


Fig. 1.

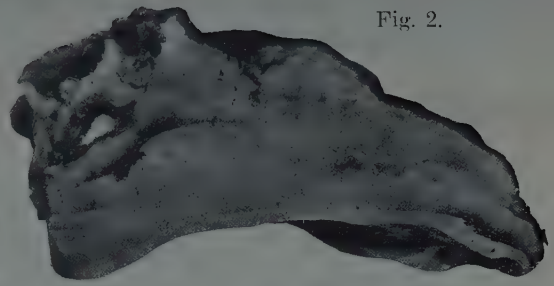
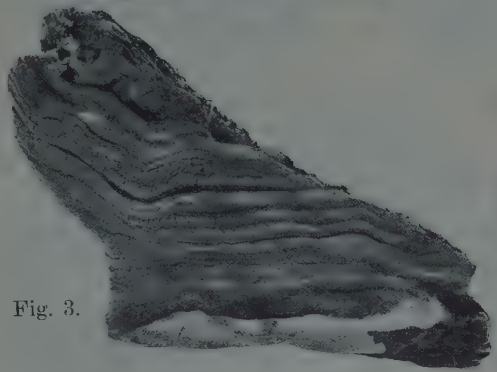


Fig. 2.



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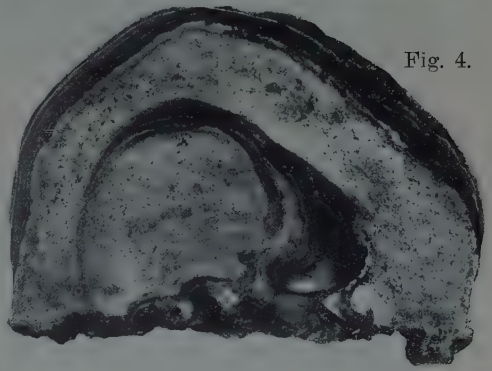


Fig. 4.

Fig. 1.—*Fomes hemitephrus*, x 1/3. Ungulate form without sulcate zones on the surface, showing in addition imperfect development of tube strata on lower surface. Probably the form determined as *F. hornodermus* by Lloyd.

Fig. 2.—*F. hemitephrus*, x 1/2. Section of typical applanate form showing the context, numerous pore strata and crust.

Fig. 3.—*F. hemitephrus*, x 1/3. Subresupinate form showing the sulcate surface. Plant was growing in exactly the position photographed.

Fig. 4.—*F. hemitephrus*, x 1/2. Ventral surface showing development of a second pileus on the surface of the old ventral surface.

Fig. 5.

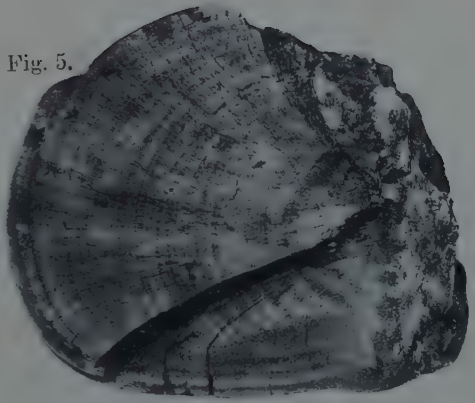


Fig. 7.

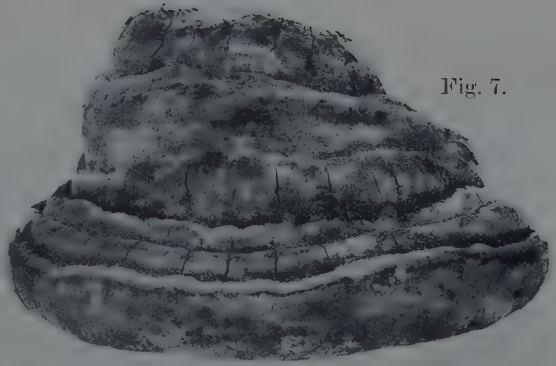


Fig. 6.

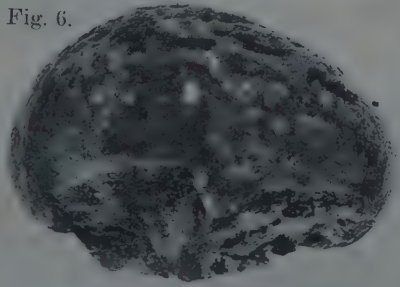


Fig. 8.

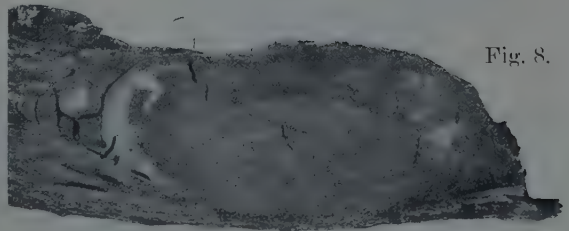


Fig. 5.—*Fomes robustus*, x 1/3. Subglobose form not uncommon in New Zealand. Note the strong development of both radial and concentric zones in the context.

Fig. 6.—*F. robustus*, x 1/2. Small, subglobose, usually resupinate form without a crust.

Fig. 7.—*F. robustus*, x 1/3. Ungulate form not uncommon in New Zealand. Note the strongly sulcate surface and rimose crust. Contrast with Fig. 5.

Fig. 8.—*F. robustus*. 1/2. Subresupinate form on *Cassinia leptophylla*. Note pileus development on left.

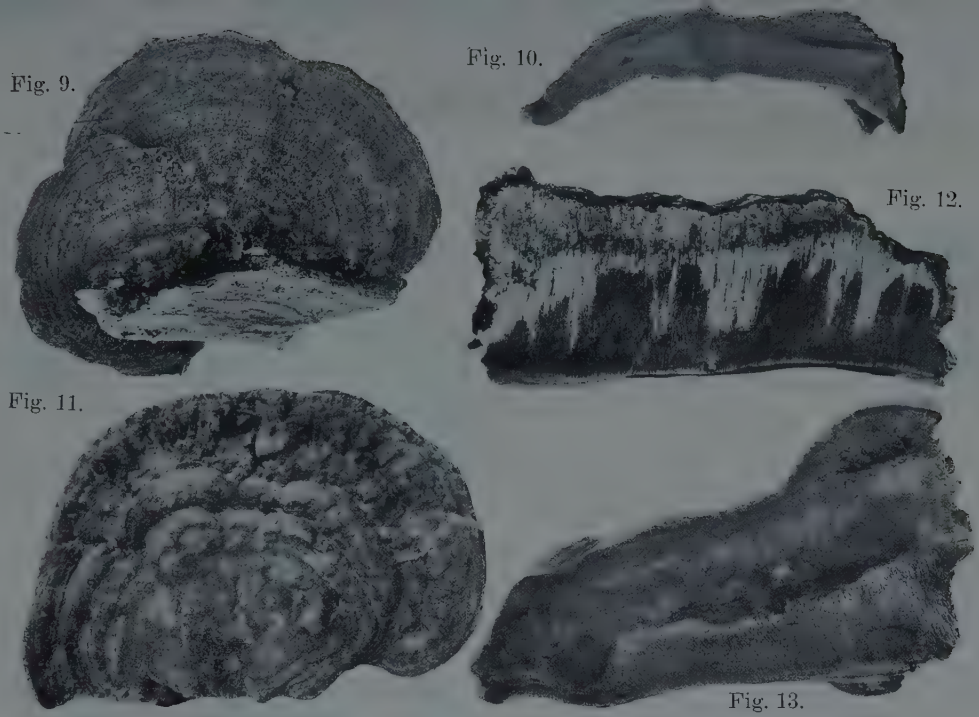
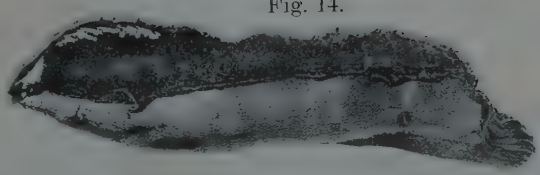



Fig. 9.—*Fomes zelandicus*, x 1/2. Applanate form with zoned surface but no distinct crust.
Fig. 10.—*F. zelandicus*, x 1/2. Section through pileus showing the absence of a crust, thin context and obscure strata.
Fig. 11.—*Fomes applanatus*, x 1/2. Typical plant, with a strongly sulcately zoned, rugulose and tuberculate surface.
Fig. 12.—*Fomes australis*, x 1/3. Section through the pileus of the applanate form. Note strong development of tubes, and thick crust. Specimen infected with a parasitic fungus, hence discoloured nature of the context and tube strata.
Fig. 13.—*F. australis*, x 1/3. Section through sub-ungulate form on *Salix*.

Fig. 14.



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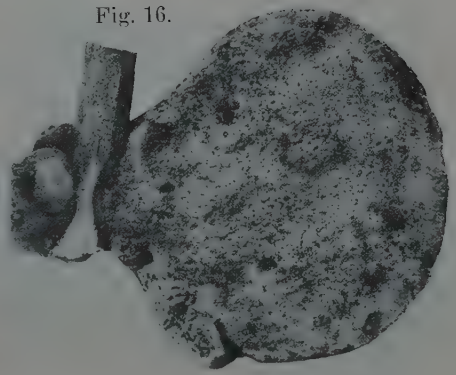

Fig. 15.

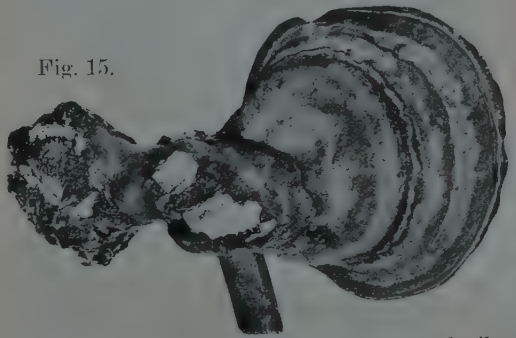

Fig. 17.

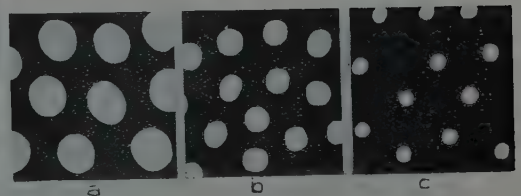


Fig. 14.—*Fomes subtornatus*, x 1/2. Section through pileus of applanate form showing thick crust and zones of crust in context. Plant attacked at point of attachment by a parasitic fungus.

Fig. 15.—*F. subtornatus*, natural size. Young plant showing lateral stipe-like point of attachment.

Fig. 16.—*F. subtornatus*, natural size. Ventral surface of Fig. 15, showing the pitted nature of the tube layer, characteristic of this species.

Fig. 17.—Diagram of the tubes of related species, x 35. (*a*) *F. australis;* (*b*) *F. applanatus;* (*c*) *F. subtornatus*, Note that in *a* and *b* the walls are about the same thickness, but the tubes vary considerably in diameter; whereas in *c* the walls are much thicker and the tubes of smaller diameter. Drawn with a camera lucida from actual sections taken from immediately beneath the tube mouths.

[illegible] conjointly by H. Drake and the writer.

mycelium grows from the margins, and sometimes also from the central portions of the ventral surface of the pileus, and covers the preceding tube layer. In this tubes rapidly appear, and shortly spore discharge occurs, spores being liberated over a short period in such numbers as to colour white, underlying branches, pilei and the like. In other species spore discharge differs considerably. For example White (34) has shown that with *F. applanatus* spore discharge is continuous over a period of six months; Faull (14) has shown that *F. fomentarius* develops a new stratum of tubes in the autumn but delays production and liberation of spores until the spring; and that each stratum may produce spores for four years in succession.

After discharge, the ventral surface often becomes discoloured, frequently black. As many as 20 strata have been counted in one specimen, so obviously the plant must live for a considerable period, in the specimen under consideration at least ten years.

The species is a saprophyte, occurring on fallen (or dead standing) logs in beech forests. But other species of the genus present in New Zealand are of considerable economic importance, as they attack and destroy many of our most valuable timber trees. It is hoped, working in collaboration with Officers of the State Forest Service, these timber rots will be thoroughly investigated; but as such an investigation is not possible until our species are known, the object of the present paper becomes obvious.

In working over the species in his herbarium, the writer found it was a simple matter to arrange specifically the plants contained therein; but he found it was much more difficult to apply names to those species on account of the chaotic nature of the literature. In consequence he has had to obtain much material from abroad for comparative purposes, and to call on the aid of those workers abroad who have familiarized themselves with the plants of their region, for comparisions of New Zealand material with species occuring elsewhere.

For aid in these particulars the writer is indebted to the following:—

The late Dr. C. G. Lloyd, Cincinnati, Ohio; Dr. J. R. Weir, Mycological Exchange, Dept. of Agriculture, Washington, U.S.A.; Dr. J. B. Cleland, The University, Adelaide, South Australia; Miss E. M. Wakefield, Royal Herbarium, Kew, England; Mr. E. W. Mason, Imperial Bureau of Mycology, Kew, England; the late Dr. N. Patouillard, France; Abbe G. Bresadola, Trento, Italy; and for collections of New Zealand material, those individuals cited under the different species.

## KEY TO THE SPECIES.

| | |
|---|---|
| Context white or light coloured .... .... .... | 1. *F. hemitephrus.* |
| Context ferruginous or fulvus; cystidia present; spores hyaline and smooth. | |
| Surface with a definite hard crust .... .... | 2. *F. robustus.* |
| Surface without a crust .... .... .... .... | 3. *F. zelandicus.* |

Context chocolate or umber; cystidia absent; spores coloured and verruculose.
Walls of tubes thin, about 0.1 mm.
Tubes about 0.18 mm. diam. .... .... .... 4. *F. applanatus.*
Tubes about 0.25-0.3 mm. diam. .... .... 5. *F. australis.*
Walls of tubes thick, about 0.2 mm. .... .... 6. *F. subtornatus.*

DISTRIBUTION.

| | |
|---|---|
| *F. applanatus* | N.Z., Aus., Europe, N. & S. America, Asia. |
| *F. australis* | N.Z., Aus., Tropical America and Asia. |
| *F. hemitephrus* | N.Z., Aus. |
| *F. robustus* | N.Z., Aus., Europe, N. America. |
| *F. subtornatus* | N.Z., East Indies. |
| *F. zelandicus* | N.Z. ? Java. |

The distribution of the species is interesting, for with the possible exception of *F. zelandicus*, not one is endemic, yet most occur on endemic hosts.

1. **Fomes hemitephrus** (Berkeley) Cooke, *Grevillea*, vol. 14, p. 21, 1885. (Figs. 1-4).

*Polyporus hemitephrus* Berk., *Fl. N.Z.*, vol. 2, p. 179, 1855.
*P. hemitrephius* Berk., *Hdbk. N.Z. Fl.*, p. 608, 1864.
*F. martius* Lloyd, *Syn. Gen. Fomes*, p. 214, 1915.
*F. cuneatus* Lloyd, *l.c.*, p. 217.

Pileus applanate, seldom ungulate, sometimes resupinate, attached by a broad base, 3-14 x 3-25 x 1-9* c.m.; surface covered with a definite hard and firm crust, at first reddish-brown, becoming black and shining, especially when cut, 0.25-2 mm. thick, bay brown, umber or black, zoned, often tuberculate, in old plants frequently rimose; context firm and tough, white to isabelline, frequently zoned, tawny orange immediately beneath the crust; ventral surface plane or irregular, often with a posterior decurrent spur, margin sometimes incurved, white when young, becoming isabelline, brown or black; tubes distinctly stratose, colour of the context, mouths minute, about 5 to mm.; spores hyaline, elliptical, smooth, 3-6 x 2-3 mmm.†; setae absent.

Habitat: On fallen and dead standing trunks of *Nothofagus* spp. (chiefly *N. fusca* (Hook. f.) Oerst.).

York Bay, Wellington; Sept. 1921; June 1922; Apl. 1926; Jan. 1927; *G.H.C.*
Day's Bay, Wgton; Nov. 1926; ***D. W. McKenzie!***
Paekakariki, Wgton.; June 1923; ***J. C. Neill!***
Longwood Range, Southland, 1200 m.; Nov. 1924; ***J. C. Neill!***
Dunedin, Otago; Nov. 1926; *Messrs. Scott-Thomson and Simpson!*

*To standardize descriptions, the writer has followed Murrill (27) and other recent workers in using figures which represent length, breadth and thickness respectively. In all, the greatest part of the pileus is considered in the measurement, including, when present, the lateral stipe-like point of attachment. Generally, however, plants vary to such an extent that measurements can convey only approximately any idea as to size.

†The spore measurements given are based on spores attached to basidia. Spores are rare in herbarium specimens (of this species) so that these measurements may possibly have been based on immature spores, though agreeing with spores obtained from spore prints.

Distribution: Australia; New Zealand.

Common in beech forests in Wellington Province. It apparently does not attack living trees, but further work is necessary before this can be determined with certainty.

A highly variable species, characterized by the pallid isabelline colour of the context, tubes and ventral surface; definite crust with underlying tawny orange coloured context; distinctly stratose tubes, hyaline, smooth spores, and absence of setae.

The shape varies from applanate to ungulate. The surface may be anoderm (especially in young plants) or covered with a reddish-brown or black firm and hard crust, which may be zoned, tuberculate or rimose. The ventral surface also varies considerably. In young and vigorously growing plants it is even and usually white (or isabelline in herbarium specimens). In old plants, as the vigour of the plant declines, the strata may not extend over the whole surface, when the fresh portion contrasts strongly with the old and discoloured surface. Often small "islands" only develop, and as the plant ages, this gives rise to several regions of strata on the same pileus.

*F. martius* Lloyd does not appear to differ in any particular; *F. cuneatus* Lloyd is an ungulate form (not uncommon in the collections at hand); consequently both are considered synonyms of *F. hemitephrus*, especially as they occur on the same host genus.

Lloyd has recorded both *F. hornodermus* and *F. pinicola* as occurring in New Zealand (26, p. 214, 219); but as neither has been found by the writer, nor been recorded as being present in New Zealand by any other worker, the writer believes them to be based on misdeterminations of *F. hemitephrus*.

2. **Fomes robustus** Karsten, *Krit. Ofvers. Finl. Basidsv.*, p. 467, 1889. (Figs. 5-8.)
*Pyropolyporus Calkinsii* Murr., *Bull. Torr. Bot. Cl.*, vol. 30, p. 113, 1903. (teste Bresadola).
*Fomitiporia dryophila* Murr., *N. Am. Fl.*, vol. 9, p. 8, 1907 (teste Bresadola).
*F. tsugina* Murr., *l.c.*, p. 9. (teste Bres.).
*Pyropolyporus Bakeri* Murr., *l.c.*, p. 104, 1908. (teste Bres.).
*P. Robinsoniae* Murr., *l.c.*, p. 108. (teste Bres).
*Fomes Hartigii* (Allesch.) Sacc. et Trav., *Syll. Fung.*, vol. 19, p. 712, 1910 (teste Bres.).
*F. setulosus* Lloyd, *Syn. Gen. Fomes*, p. 243, 1915. (teste Lloyd).
*F. squarrosus* Lloyd *l.c.*, p. 247.
*Phellinus robustus* (Karst.) Boud. et Galz., *Bull. Soc. Myc. Fr.* vol. 41, p. 188, 1925.

Pileus ungulate or subglobose, often resupinate, attached by a broad base, equal, 3-16 x 4-25 x 3-15 cm.; surface at first light fulvus and tomentose, becoming covered with a thick (1-5mm.), hard, dull black crust, usually sulcately zoned and often rimose; context bright fulvus yellow, in old specimens often approaching ferruginous, firm, hard, radially and concentrically zoned; ventral surface even, concolorous with the context; tubes distinctly stratose, mouths about 5 to

mm., concolorous, subhymenium cellular, hyaline; spores globose to subglobose, 6-8 mmm., hyaline, smooth, sparse; setae abundant, chestnut brown, ventricose, acuminately pointed.

Habitat: On living trunks of *Nothofagus fusca* (Hook. f.) Oerst.
York Bay, Wellington; Sept. 1921; Apl. 1926; Jan. 1927; *G.H.C.*
Day's Bay, Wellington; Nov. 1926; *D. W. McKenzie!*
Paekakariki, Wellington; June 1923; *J. C. Neill!*
Rotorua, State Forest Reserve; *Unknown collector!*
On living branches of *Cassinia leptophylla* (Forst. f.) R. Br.
Weraroa, Wellington; Mar. 1926; *H. McDonald—G.H.C.*
White Rock Station, Featherston, Wellington; *J. Barton!* May 1927.
Dead *Leptospermum scoparium* Forst. branch.
Dunedin, Otago; Oct. 1925; *Miss H. K. Dalrymple!*
(Setae absent, but otherwise the same.)

Distribution: Britain, Europe, North America, Australia, New Zealand.

The marked ungulate, often globose shape, light fulvus coloured context, hard crust, abundant setae and subglobose, hyaline, smooth spores are the characters of the species.

The plant is not uncommon in beech forests in the Wellington Province, where it produces a serious heart-rot of *Nothofagus fusca*. The species is often confused with *F. igniarius*, which differs in the darker colour of the context, but otherwise appears to be identical. Setae are abundant in all New Zealand collections, and apparently also in most Australian plants, according to Cleland and Cheel (10), though these workers have recorded occasional collections in which few or none are present; but many European and North American collections are known in which they are consistently absent. This shows that the presence or absence of setae is of little specific significance.

The form on *Cassinia leptophylla* is responsible for the killing of numerous plants of this coastal shrub in the Weraroa and Featherston districts. Recently, in company with Mr. H. McDonald, the writer made an inspection of an area near Weraroa beach where numbers of plants had been destroyed. Penetration was effected through the crutches of the branches, which in this plant readily split apart. Here a rapid white heart rot was produced, followed by death of the plant. The pilei were secured in numbers usually near the base of dying plants, but were also numerous on dead branches lying on the ground. Most were resupinate, but a few showed scanty pileus formation. Otherwise they agreed in all particulars, especially in microscopic details, with *F. robustus*. The colour of the context of most was also the same, but in some both context and surface of the pores were darker, approaching ferruginous. These latter could be referred to light coloured forms of *F. igniarius:* but as most are typically *F. robustus* in colour, and as *F. igniarius* has not been collected in Australasia, it is considered advisable to keep this form under *F. robustus*. It is worthy of note that this colour variation occurs also in certain normal pilei of *F. robustus*.

3. **Fomes zelandicus** Cooke, *Grevillea*, vol. 8, p. 57, 1879 (Figs. 9-10.)

Pileus applanate or plane, frequently resupinate, often dimidiate, attached by a broad base, 3-14 x 5-25 x 1-4 cm.; exterior concentrically, often sulcately zoned, fulvus to umber, lighter in colour towards the thin and entire margin, hard, woody, but without a distinct crust, margin even or crenulate; context thin, 2-5 mm., fulvus to reddish-brown; tubes indistinctly stratified, stuffed, sometimes interrupted by layers of context, ferruginous or concolorous with context; ventral surface even, margin sterile, mouths concolorous, about 6 to mm., subhymenium hyaline, cellular; spores subglobose or more frequently elliptical, 3.5-5 mmm., smooth, hyaline; setae abundant, acuminate, often hooked, ventricose, chestnut brown.

Habitat: Dead fallen logs of *Nothofagus* spp., *Dacrydium cupressinum* Sol., and *Podocarpus spicatus* R. Br.
Weraroa, Wellington; July 1919; *G.H.C.*
Wilton's Bush, Wellington; Nov. 1926; *D. W. McKenzie!*
Day's Bay, Wellington; Nov. 1926; *D. W. McKenzie!*
Ngaio, Wellington, Nov. 1926; *D. W. McKenzie!*

Distribution: New Zealand, (?) Java (teste Bres. 6).

The thin applanate, often plane pileus, absence of a definite crust, thin fulvus or ferruginous context, chestnut setae and hyaline, smooth spores are the characters of the species.

Collections sent abroad have been determined as *Fomes senex* (Nees et Mont.) Fr., a plant with coloured spores; but as our plant has hyaline spores, it is evident it cannot be considered the same as *F. senex*, though agreeing in most other particulars.

Bresadola (7) lists *F. zelandicus* as a synonym of a form of *Polyporus Korthalsii* Lev.; but Lloyd (26, p. 277) states that the latter plant is in turn a synonym of *P. sideroides*. In another paper (Letter 36, p. 3, 1911) Lloyd stated that *P. sideroides* has globose, coloured spores, and is moreover stipitate, and considered that *P. Korthalsii* was merely a sessile form of this species, possessing exactly the same coloured spores. Bresadola, in a later paper (9) in discussing *F. Hochnelii* Bres., and comparing it with *F. zelandicus* (which he now considered as valid) stated that the pileus of the latter is applanate, the context fulvus, pores minute, and spores absent (from the type), and contended that because they are absent they are hyaline (for it is a well-known feature of the genus that spores are sparse and often absent from plants of species possessing hyaline spores).

In view of these facts the writer considers that our plant, on account of its hyaline spores (which are abundant in one or two collections at hand) is specifically distinct from *F. senex*, and contends that it is co-specific with *F. zelandicus*, the type only of which is known, and proposes therefore to use this specific name.

Bresadola's record of the occurrence of *F. zelandicus* in Java is possibly based on *F. senex* (for spores were not found), so that there is a possibility our plant is endemic, as the type was named from New Zealand.

4. **Fomes applanatus** (Persoon) Gillet, *Champ. Fr.*, vol. 1, p. 686, 1878 (Figs. 11-17, *b.*).

*Boletus fomentarius* var. *applanatus* Pers., *Syn. Meth. Fung.*, p. 536, 1801.
*Polyporus applanatus* Wallr., *Fl. Crypt. Germ.*, vol. 4, p. 591, 1833; non *P. applanatus* Fr., *Epi.*, p. 465, 1838.
*P. vegetus* Fr., *Epi.*, p. 464, 1838.
*P. megaloma* Lev., *Ann. Sci. Nat.*, ser. 3, vol. 5, p. 128, 1846.
*P. leucophaeus* Mont., *Syll. Crypt.*, p. 157, 1856.
*P. incrassatus* Berk., *Jour. Linn. Soc.*, vol. 16, p. 54, 1878.
*Fomes leucophaeus* Cke., *Grev.*, vol. 14, p. 18, 1885.
*F. megaloma* Cke., *l.c.*
*Placodes applanatus* Quel., *Fl. Myc. Fr.*, vol. 1, p. 400, 1888.
*Fomes vegetus* (Fr.) Sacc., *Syll. Fung.*, vol. 6, p. 179, 1888.
*F. incrassatus* (Berk.) Sacc., *l.c.*, p. 205.
*Elfvingia applanata* Karst., *Ofvers. Finl. Basidsv.*, p. 334, 1889.
*Phaeoporus applanatus* Schroet., *Krypt. Fl. Schles.*, vol. 3, p. 490, 1889.
*Ganoderma applanatum* Pat., *Bull. Soc. Myc. Fr.*, vol. 5, p. 67, 1889
*G. leucophaeum* Pat., *l.c.*, p. 73.
*Polyporus rubiginosus* (Schad.) Quel., *Ass. Fr.*, p. 6, 1891.
*Elfvingia lipsiensis* Murr., *Bull. Torr. Bot. Cl.*, vol. 30, p. 297, 1903.
*E. megaloma* Murr., *l.c.*, p. 300.
*Ganoderma lipsiensis* (Batsch) Atk., *Ann. Myc.*, vol. 6, p. 189, 1908.

Pileus applanate, subungulate only in young plants, seldom resupinate, attached by a small base, 5-14 x 5-20 x 4-6 cm.; surface smooth, becoming only slightly sulcately zoned, often tuberculate, umber or bay brown, dull, sometimes colour zones present, margin thin, even or crenately lobed, not or slightly incurved, at first soft, becoming covered with thick, dull brown or black crust; context chocolate or umber brown, often zoned with layers of same nature as crust; ventral surface even, varying in colour from dingy cream to deep umber; tubes obscurely stratose, cinnamon, stuffed, about 180 mmm. diam., walls about 90 mmm. thick; spores elliptical or pip-shaped, apiculate, or more frequently truncate, pallid chestnut, finely verruculose, 8-9 x 5-6 mmm.; setae absent.

Habitat: On trunks and fallen logs of *Podocarpus spicatus* R. Br., and *Dacrydium cupressinum* Sol.

Weraroa, Wellington; July 1919; *G.H.C.*
Packakariki, Wellington; June 1923; *J. C. Neill!*
Wilton's Bush, Ngaio, Wellington; Nov. 1926; *D. W. McKenzie!*
Riccarton, Canterbury; Feb. 1927; *D. W. McKenzie!*
State Forest Reserve, Rotorua; *Unknown Collector!*

Distribution: Britain, Europe, Asia, North and South America, Australia, New Zealand.

The regular applanate shape, thin tube walls, hard crust, chocolate context and verruculose, often truncate, coloured spores are the characters of the species.

This and the two following species are closely related, but may be separated by the following characters:—*

Walls of tubes 0.09-0.1 mm. thick.
Tubes 0.18-0.2 mm. diam. ..... ..... *F. applanatus.*
Tubes 0.27-0.3 mm. diam. ..... ..... *F. australis.*
Walls of tubes 0.2-0.25 mm. thick ..... ..... *F. subtornatus.*

The ventral surface of the pileus of this species varies considerably in colour according to the period of the year when collected: and to the age of the plant. For it may range through all shades from dingy cream to a deep umber.

The crust, too, varies greatly; in young plants it is soft and readily cut with a knife, and is light in colour. Whereas in older plants it is hard, firm, and sometimes (though rarely) rimose. Yet on these differences several species have been erected!

The species is regularly confused in literature with the following, yet it is quite distinct, though the distinctions are principally of the nature of minor differences difficult to define, and for this reason the writer has selected the diameter of the tubes as being the most marked feature, this being about half that of the tubes of *F. australis.*

The nature of the markings on the surface of the spores has been the subject of considerable controversy in the literature dealing with this and related species. Coleman (11) as the result of a critical examination of microtome sections, differentially stained, of several species, has shown that there are two layers comprising the wall, an outer epispore and an inner endospore. He considers, "The epispore represents the primitive spore wall, and is probably comparable with the undifferentiated spore wall of such a form as *F. fomentarius*, which is very thin, and which, treated by the same methods used for *Ganoderma* spores (=*Fomes* with this type of spore, as *F. applanatus*) has shown no differentiation whatever. It consists of a hemicellulose with possibly a gum, which latter, if present, functions in attaching the spore to the surface upon which it falls. The endospore is composed of chitin and other compound or compounds. It is laid down on the inner margin of the epispore as a series of granules which later fuse to form a membrane. This thickens and develops on its outer surface spiny processes which project into the epispore at a time when

*Variations occur even with these characters; *F. applanatus* on the one hand approaching *F. australis* in the diameter of the tubes; on the other *F. subornatus* in the thickness of the walls. Variations are dependent in large part on the age of the plants, young specimens possessing larger tubes and thinner walls. The diagrams (Fig. 17) were drawn from average specimens of medium age (approx. 5 years). Where such variation occurs, *F. subtornatus* may be recognised by the rugulose or pitted ventral surface, constant in all specimens at hand; *F. australis* by the larger size, and thicker margin (see Figs. 12, 13), characters present even in quite young plants.

the latter is still plastic. The whole endospore structure obviously functions as a sort of skeletal support to the thin and collapsible primary spore wall." If the spores are examined while fresh, they often appear quite smooth, but in herbarium specimens they regularly appear verruculose. This is due no doubt to collapse of the epispore, when the projections of the endospore become plainly visible. Probably it was because of the fact that many previous workers have examined fresh spores that they have claimed they were smooth.

5. **Fomes australis** (Fries) Cooke, *Grevillea*, vol. 14, p. 18, 1885. (Figs. 12-13, 17 *a*).

*Polyporus australis* Fr., *Elench Fung.*, p. 108, 1828.
*P. chilensis* Fr., *Nov. Symb.*, p. 63, 1851 (teste Bres.).
*P. Oerstedii* Fr., *l.c.* (teste Murrill).
*P. scansilis* Berk., *Linn. Jour. Bot.*, vol. 16, p. 56, 1878.
*Fomes scansilis* (Berk.) Sacc., *Syll. Fung.*, vol. 6, p. 165, 1888.
*F. chilensis* (Fr.) Sacc., *lc.*, p. 176.
*Ganoderma australe* (Fr.) Pat. *Bull. Soc. Myc. Fr.*, vol. 5, p. 71, 1889.
*Scindalma tornatum* Kuntze, *Rev. Gen.*, vol. 3, p. 517, 1898.
*Elfvingia tornata* (Pers.) Murr., *Bull. Tor. Bot. Cl.*, vol. 30, p. 297, 1903.
*Fomes oroflavus* Lloyd, *Syn. Gen. Fomes*, p. 265, 1915.
*F. galegensis* Lloyd, *l.c.*
*F. annularis* Lloyd, *l.c.*, p. 268.
*F. Petchii* Lloyd, *l.c.*

Pileus applanate, or ungulate, irregular in size and shape, 5-30 x 10-50 x 6-20 cm.; surface even, dull, sulcately zoned, often rimose; crust hard and firm, up to 10 mm. thick, brown to black; context chocolate or umber, often zoned with layers of tissue similar to that of the crust, hard, firm, occupying about one-third of the pileus; tubes obscurely stratose, cinnamon, often stuffed, large, 0.25-0.3 mm. diam., walls thin, about 0.1 mm., mouths even, bay brown to umber; spores 8-12 x 6-7.2 mmm., chestnut brown, frequently deeply coloured, strongly verruculose, frequently truncate; setae absent.

Habitat: On dead standing tree trunks in the forest.

Dead stump of *Coprosma lucida* Forst. f.
Weraroa, Wellington; Sept. 1919; *G.H.C.*

Trunk of living *Podocarpus spicatus* R. Br.
Peel Forest, Canterbury; Aug. 1921; *W. K. Dallas!*

Trunk of *Nothofagus Menziesii* (Hook. f.) Oerst.
Dunedin, Otago; Dec. 1926; *Scott-Thomson* and *Simpson!*

Living trunks of *Nothofagus fusca* (Hook. f.) Oerst.
Gollan's Valley, Wellington; Sept. 1921; *W. D. Reid!*
Day's Bay, Wellington; Nov. 1926; *D. W. McKenzie!*

Dead stump of *Salix babylonica* L.
Spring Creek, Blenheim, Marlborough; Dec. 1926; *G.H.C.*

Dead stump of *Acacia dealbata* Link.
Dunedin, Otago; Feb. 1923; *R. B. Tennent!*

Var. **oroflavus** (Lloyd) n. comb.
*Fomes oroflavus* Lloyd, *l.c.*
Ventral surface a pronounced sulphur yellow.
Living *Nothofagus fusca* trunk.
Day's Bay, Wellington; Nov. 1926; *D. W. McKenzie!*

Distribution: Tropical Asia and America, Australia, New Zealand.

*F. australis* is in literature regularly confused with the preceding species, so that numerous records of its occurrence in different localities are probably doubtful. Lloyd, also, regularly confused it with *F. applanatus*, for he states (26, p. 265): "It is a time-honoured custom to refer every Fomes of the section Ganodermus that came from the tropics to F. australis. . . . In the sense of Fries (type at Kew) F. australis was based on a form of F. applanatus with thin context, hence the 'praelong' pores, but on comparison with the type form in Europe, we find it is in other respects exactly the same. . . . It is a mistake to consider that Fries had any definite species, distinct from F. applanatus which he named F. australis, or that any one else has had in connection with this name. F. australis is a convenient name to which to refer the tropical forms of F. applanatus, but we would restrict it to those that have thin context and long pores."

As has been shown (under *F. applanatus*) the species is quite distinct from *F. applanatus*, being separated chiefly by the much larger diameter of the tubes; the character present also in Fries' type at Kew, but overlooked by Lloyd and most other workers.

The form mis-named *Fomes nigrolaccatus* Cke., by Lloyd (*l.c.*, p. 265) is not uncommon in New Zealand; and cannot be separated on any character from *F. australis*. The name *F. nigrolaccatus* cannot be used in any case, as according to Bresadola it is a synonym of *Polyporus galegensis* Mont.; which Lloyd, under the name of *Fomes galegensis*, considers cannot be maintained as distinct, even as a form, from *F. applanatus*.

*F. australis* is the cause of a serious heart rot of numerous timber trees in New Zealand (beech, matai, rimu). It is perhaps the largest fungus found in the Dominion, for one specimen the writer has examined was 90 cm. in width.

Lloyd's *F. annularis* and *F. Petchii* are forms only of this species, agreeing closely (judging from Lloyd's photographs and descriptions) with several New Zealand specimens, which the writer considers cannot be separated from *F. australis*. That names for every slight variant are superfluous becomes evident to any one dealing with abundant specimens, for then the range and extent of the variations of the species becomes clearly defined, and plants which if collected individually might by certain workers be considered as species, are seen to be forms only, linked up by numerous others with the species under consideration. It is because the majority of species in this

family have been based on single specimens, that there is so much confusion and so many synonyms in the literature dealing with the group.

Lloyd's *F. oroflavus* differs only in the sulphur yellow colour of the ventral surface of the pileus. The writer has seen only one specimen with this character, so does not know whether it is constant, or merely accidental; but as other collections have been recorded with the same feature, it seems worthy of a varietal name.

6. **Fomes subtornatus** (Murrill) Lloyd, *Syn. Gen. Fomes*, p. 269, 1915. (Figs. 14-16, 17, *c*.)

*Ganoderma subtornatum* Murr., *Bull. Torr. Bot. Cl.*, vol. 34, p. 477, 1907.

*F. pseudoaustralis*, Lloyd, *l.c.*

*F. polyzonus*, Lloyd, *l.c.*

*F. Koningsbergii* Lloyd, *l.c.*, p. 270.

Pileus applanate, seldom ungulate, not infrequently sub-resupinate, often irregular in shape, and with a lateral stipe-like projection which often attains considerable length, 2-15 x 5-18 x 2-5 cm.; surface with a hard crust, firm, black or brown, sometimes polished, sulcately zoned, often tuberculate and irregular; context chocolate brown or umber, often zoned concentrically with bands of the same nature as the crust, tough, firm, occupying about one half the pileus, margin irregularly crenate, lobed or even, rounded; tubes cinnamon, stuffed, obscurely stratose, ventral surface ranging in colour from cream to umber, even or more often rugulose or irregularly pitted; mouths minute, about 0.1 mm. diam., walls thick, 0.2-0.25 mm. thick; spores 6-7.5 x 6-6.5 mmm., shortly elliptical, truncate or not, pallid chestnut, minutely but distinctly verruculose.

Habitat: On fallen trunks of *Podocarpus spicatus* and *Dacrydium cupressinum*.

Weraroa, Wellington; Sept. 1919; *G.H.C.*

Whakarewarewa, Rotorua; Dec. 1923; *State Conservator!*

Wilton's Bush, Wellington; Nov. 1926; *D. W. McKenzie!*

Distribution: Phillipines, Madagascar, Java, New Zealand.

The species is most closely related to *F. applanatus*, but differs in the more irregular shape, the usual lateral stipe-like projection, and especially in the usually pitted and rugulose ventral surface, and the thick walls of the tubes.

It will be seen that Lloyd's *F. pseudoaustralis*, *F. polyzonus* and *F. Koningsbergii* are merely variants of the species under consideration, and cannot be separated on any character, for all characters he considers as specific, as shining laccate crust, zones of crust in context, etc., may be present or absent in different plants of the same collection.

## DOUBTFUL AND EXCLUDED SPECIES.

The following species have been recorded as occurring in New Zealand by different workers, chiefly Lloyd. The writer has not seen specimens.

(*a*) *Fomes Clelandii* Lloyd. In *Letter 68,* p. 8, 1918, Lloyd records this species as being collected in New Zealand by W. A. Scarfe.

(*b*) *Fomes fraxineus* (Bull.) Fr. In *Letter 49,* p. 9, 1914, Lloyd doubtfully records this species as being collected in New Zealand by W. A. Scarfe.

(*c*) *Fomes Hauslerianus* (Henn.) Lloyd.

This species, described from specimens collected on tree trunks at Ohaupo, Auckland, by Hauesler, it is not possible to place owing to the faulty description. Lloyd (*Syn. Stip. Polyp.*, 109, 1912) states that he did not find the type at Berlin. On these counts the species should be removed from the literature.

(*d*) *Fomes hornodermus* Mont. recorded by Lloyd (from New Zealand) is probably a misdetermination of *F. hemitephrus* (*q.v.*). This is made more certain by a note in *Letter 67,* p. 13, 1918, where Lloyd states that he does not know any method of separating *F. hemitephrus* from *F. hornodermus.*

(*e*) *Fomes martius* Lloyd. This as Lloyd has shown, *Letter 65,* p. 7, 1917, is a synonym of *F. hemitephrus.*

(*f*) *Fomes nigrolaccatus* Cke. In *Letter 63,* p. 7, 1916, Lloyd records this species as being collected in New Zealand. As has been shown, under *F. australis,* the plants he has determined as this species belong to *F. australis*; and furthermore, that *F. nigrolaccatus* cannot be used as a valid name, as it is a synonym of another species.

(*g*) *Fomes pinicola* has doubtfully been recorded by Lloyd as occurring in New Zealand. As shown the writer believes he has misdetermined a specimen of *F. hemitephrus.*

(*h*) *Fomes pomaceus* (Pers.) Big. et Guill. Lloyd, *Myc. Notes,* p. 1125, 1922, records this as being collected in New Zealand by J. Mitchell.

(*i*) *Fomes Robinsoniae* (Murr.). Lloyd records this in *Letter 63,* p. 15, 1916, as being collected in New Zealand, but as shown, it is a synonymn of *F. robustus.*

(*j*) *Fomes rufoflavus* (Berk. et Curt.) Sacc. Lloyd has determined for the writer one collection as above. The specimens have only one tube layer, and will therefore be considered under the genus *Polyporus* (as *P. Braunii* Rabenh.). It is, like *Polyporus gilvus,* one of those plants which have usually one layer of tubes, but which under certain conditions, develop several strata. As other characters tend to link it with *Polyporus,* it will be treated as such, as is usually done in the case of *P. gilvus,* though several workers consider it a valid *Fomes.* The peculiar cystidia present are also unlike any encountered in the species of *Fomes* examined by the writer, and recall those present in *Poria eupora.*

(*k*) *Fomes senex* (Nees et Mont.) Fr. Lloyd has recorded two collections of this plant from New Zealand (*Letter 60,* p. 2, 1915 and *Letter 65* p. 11, 1917). The writer believes he has misdetermined plants of *F. zelandicus,* which, as has been shown, agree in all particulars save the hyaline spores, with *F. senex.*

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17. —— *Genera Hymenomycetum*, 17 pp. 1836.
18. —— *Epicrisis systematis mycologici*, 608 pp. 1838.
19. —— *Novae Symbolae Mycologicae*, 119 pp., 1851.
20. GILLET, C. C. *Les Champignons (Fungi, Hymenomycetes) qui croissent en France*, 828 pp., 1878-1890.
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(Plates 25-29.)

## 2.—The Genus Polyporus (including Polystictus).

MOST of the species of the Polyporaceae are grouped under this genus, upwards of 1,500 having been described to date. As an outline of the classification of this and related genera has been given in the previous part, further reference will be unnecessary. The genus was first established by Micheli (1729), but was not generally recognized until the appearance of Fries' *Systema* (6), Linnaeus, and later Persoon, using the generic name *Boletus* for polyporoid species.

As has been shown, it was separated from *Fomes* in that the tubes form a single stratum, and not a series,* and is separated from *Trametes* in that the proximal ends of the tubes form an even layer through all being sunk to the same depth into the context. In *Trametes*, they occur at different depths, often giving a very irregular appearance to their proximal surface.

2. **Polyporus** Micheli ex Fries, *Syst. Myc.*, vol. 1, p. 341, 1821.

*Grifola* Gray, *Nat. Arr. Brit.* Pl., vol. 1, p. 643, 1821.
*Coltricia* Gray, *l.c.*, p. 644.
*Strilia* Gray, *l.c.*, p. 645.
*Albatrellus* Gray, *l.c.*
*Sistotrema* Pers. ex Fr., *Syst. Myc.*, vol. 1, p. 426, 1821.
*Ceriomyces* Cda., in Sturm *Deut. Fl.*, p. 133, 1837.
*Ptychogaster* Cda., *Ic. Fung.*, vol. 2, p. 24, 1838.
*Gloeoporus* Mont., *Ann. Sci. Nat.*, ser. 2, vol. 17, p. 120, 1842.
*Enslinia* Fr., *Summa Veg. Scand.*, p. 399, 1849.
*Polystictus*, Fr., *Nov. Symb.*, p. 70, 1851.
*Merisma* Gill., *Champ. Fr.*, vol. 1, p. 688, 1878.
*Polyporellus* Karst., *Medd. Soc. Faun. et. Fl. Fenn.*, vol. 5, p. 37, 1879.
*Bjerkandera* Karst., *l.c.*, p. 38.
*Hansenia* Karst., *l.c.*, p. 39.
*Inonotus* Karst., *l.c.*
*Inoderma* Karst., *l.c.*
*Bresadolia* Speg., *Anal. Soc. Cientf. Arg.*, vol. 10, p. 15, 1880.
*Piptoporus* Karst., *Rev. Myc.*, vol. 3, p. 17, 1881.
*Polypilus* Karst., *l.c.*
*Postia* Karst., *l.c.*
*Tyromyces* Karst., *l.c.*
*Hapalopilus* Karst., *l.c.*, p. 18.
*Meripilus* Karst., *Bidr. Finl. Nat. och Folk.*, vol. 37, p. 33, 1882.

*Sometimes exceptions occur, especially in tropic and sub-tropic regions; for example *P. gilvus*, *P. Braunii* and *P. hirsutus* occasionally show the tubes in strata, each stratum usually being separated from the other by an intervening layer of context.

*Myriadoporus* Peck, *Bull. Torr. Bot. Cl.*, vol. 11, p. 27, 1884.
*Caloporus* Quel., *Ench. Fung.*, p. 164, 1886.
*Leucoporus* Quel., *l.c.*, p. 165.
*Pelloporus* Quel., *l.c.*, p. 166.
*Cerioporus* Quel., *l.c.*, p. 167.
*Cladomeris* Quel., *l.c.*
*Inodermus* Quel., *l.c.*, p. 173.
*Leptoporus* Quel., *l.c.*, p. 175.
*Coriolus* Quel., *l.c.*
*Melanopus* Pat., *Hym. Eur.*, p. 137, 1887.
*Spongipellis* Pat., *l.c.*, p. 140.
*Phaeoporus* Schroet., *Krypt. Fl. Schles.*, vol. 3, p. 489, 1888.
*Oligoporus* Bref., *Unters.*, vol. 8, p. 114, 1889.
*Mucronoporus* Ell. et Ev., pp., *Jour. Myc.*, vol. 5, p. 28, 1889.
*Onnia* Karst., *Finl. Basidsv.*, p. 326, 1889.
*Laccocephalum* McAlp. et Tepp., *Proc. Roy. Soc. Vic.*, vol. 7, p. 166, 1894.
*Henningsia* Moell., *Bot. Mittheil.*, vol. 8, p. 44, 1895.
*Xanthochrous* Pat., *Cat. Pl. Tunisie*, p. 51, 1897.
*Phaeolus* Pat., *l.c.*, p. 86.
*Funalia* Pat., pp., *Tax. Hymen. Eur.*, p. 95, 1900.
*Cryptoporus* Shear, *Bull. Torr. Bot. Cl.*, vol. 29, p. 450, 1902.
*Scutiger* Paul; Murr., *Bull. Torr. Bot. Cl.*, vol. 30, p. 425, 1903.
*Porodiscus* Murr., *l.c.*, p. 432.
*Romellia* Murr., *Ibid.*, vol. 31, p. 338, 1904.
*Coltriciella* Murr., *l.c.*, p. 348.
*Abortiporus* Murr., *l.c.*, p. 421.
*Cyclomycetella* Murr., *l.c.*, p. 422.
*Poronidulus* Murr., *l.c.*, p. 425.
*Laetiporus* Murr., *l.c.*, p. 607.
*Trichaptum* Murr., *l.c.*, p. 608.
*Pogonomyces* Murr., *l.c.*, p. 609.
*Coriolopsis* Murr., pp., *Ibid.*, vol. 32, p. 358, 1905.
*Flaviporus* Murr., *l.c.*, p. 360.
*Nigroporus* Murr., *l.c.*, p. 361.
*Dendrophagus* Murr., *l.c.*, p. 473.
*Spongiporus* Murr., *l.c.*, p. 474.
*Rigidoporus* Murr., *l.c.*, p. 478.
*Earliella* Murr., *l.c.*
*Cubamyces* Murr., *l.c.*, p. 480.
*Microporellus* Murr., *l.c.*, p. 483.
*Flaviporellus* Murr., *l.c.*, p. 485.
*Aurantiporellus* Murr., *l.c.*, p. 486.
*Aurantiporus* Murr., *l.c.*, p. 487.
*Pycnoporellus* Murr., *l.c.*, p. 489.
*Phaeolopsis* Murr., *l.c.*
*Tomophagus* Murr., *Torreya*, vol. 5, p. 197, 1905.
*Cycloporellus* Murr., *Bull. Torr. Bot. Cl.*, vol. 34, p. 468, 1907.
*Fuscoporia* Murr., pp., *N. Am. Fl.*, vol. 9, p. 3, 1907.

*Fuscoporella* Murr., pp., *l.c.*, p. 6.
*Porodisculus* Murr., *l.c.*, p. 47.
*Tyromyces* Murr., *Mycologia*, vol. 4, p. 96, 1912.
*Amaurodermus* Lloyd, *Syn. Stip. Polyp.*, p. 110, 1912.
*Lignosus* Lloyd, *l.c.*, p. 122.
*Petaloides* Lloyd. *l.c.*, p. 129.
*Merismus* Lloyd, *l.c.*, p. 148.
*Spongiosus* Lloyd, *l.c.*, p. 157.
*Pelloporus* Lloyd, *l.c.*, p. 162.
*Ovinus* Lloyd, *l.c.*, p. 166.
*Lentus* Lloyd, *l.c.*, p. 170.
*Ungularia* Laz., pp., *Polip. Esp.*, p. 113, 1917.
*Polystictoides* Laz., *l.c.*, p. 145.

Pileus stipitate, sessile (when usually dimidiate) or resupinate; stem central, lateral or absent, simple or branched; context white or coloured, fleshy, corky, coriaceous or sub-woody, but not gelatinous; tubes merging with the context, or distinct and separable, round or irregular, at proximal ends sunk the same depth into the context; cystidia (or setae) present or absent, hyaline or coloured; spores continuous, hyaline or coloured, smooth or echinulate; basidia unicellular, sterigmate, usually tetrasporous.

Habitat: Ligneous or terrestrial.

Distribution: World-wide.

As is shown by the synonymy, the genus has proved a difficult one for the systematist, for not only is there considerable differences of opinion as to specific characters, but also as to generic characters. As has been shown in the previous part, the majority of these genera are based on inconstant characters, and cannot be maintained; many others are monotypic and often based on freaks. One or two require further discussion before being dismissed. *Polystictus*, as has been shown, cannot be maintained as a genus, as it is not possible to separate it from many species of *Polyporus*. *Ceriomyces* and *Ptychogaster* are based on abnormal forms which have not developed a tube layer. *Gloeoporus* is based on the presence of a distinct separable hymenial layer; quite a good generic character, but to avoid complication its use is considered unnecessary in a flora where there are so few species. Lloyd (10) has been careful to point out that he has considered the names he uses as being sectional only, yet under his illustrations and in his indices, he uses those sectional names in a generic sense; hence they must be listed as synonyms of *Polyporus*. The remainder may be dismissed without further mention. Their only function is to illustrate what confusion can be caused in literature by the erection of genera on the slightest pretext.

*Table of distribution of the New Zealand species.*

| Species. | Distribution: |
|---|---|
| *Polyporus* | |
| *adustus* | N.Z., Aus., Europe, N. America, Asia. |
| *anthracophilus* | N.Z., Aus. |
| *arcularius* | N.Z., Aus., Europe, N. America. |
| *Berkeleyi* | N.Z., Aus., — N. America, — Japan. |
| *Braunii* | N.Z., — Europe, Tropical East and W. Indies. |
| *catervatus* | N.Z. |
| *Colensoi* | N.Z. |
| *dichrous* | N.Z., Aus., Europe, N. & S. Am., Asia, S. Africa. |
| *Eucalyptorum* | N.Z., Aus. |
| *gilvus* | N.Z., Aus., N. and S. America, Europe, Tropics generally. |
| *hirsutus* | N.Z., Aus., Europe, America, Asia. |
| *melanopus* | N.Z., Aus., Europe. |
| *oblectans* | N.Z., Aus., Europe, N. America, Tropical Asia. |
| *proprius* | N.Z. |
| *radiatus* | N.Z., Aus., Europe, N. America. |
| *tabacinus* | N.Z., Aus., S. America, Africa, East Indies. |
| *versicolor* | N.Z., Aus., N. America, Europe, Asia. |

Thus three species of those described in this paper are endemic, two others extend to Australia; and the remainder have a wide distribution. Most occur on wood, but one—*P. Colensoi*—grows on the ground. Of those with a ligneous habitat, but two are of economic importance in that they attack living trees.

*P. Eucalyptorum* is the cause of a serious heart-rot of *Nothofagus* spp. in our forests; and *P. versicolor* has proved a troublesome wound-parasite of peach trees in the Auckland province.

KEY TO THE SPECIES.

Pileus stipitate.
- Stipe and/or pileus compound.
  - Spores strongly echinulate ..... 1. *P. Berkeleyi*
  - Spores smooth.
    - Pileoli soft and fleshy; plants terrestrial..... 2. *P. Colensoi*
    - Pileoli hard and woody; plants ligneous..... 3. *P. anthracophilus*
- Stipe and pileus simple.
  - Stipe central (seldom excentric).
    - Exterior of pileus strongly hispid ..... 4. *P. oblectans*
    - Exterior of pileus smooth or almost so.
      - Tube layer normal, tubes large ..... 5. *P. arcularius*
      - Tube layer apparently inverted; tubes minute ..... 6. *P. catervatus*
  - Stipe excentric or lateral, prominent, black ..... 7. *P. melanopus*

Pileus sessile; dimidiate or effused-reflexed, often imbricate.
- Context white or isabelline.
  - Spores smooth.
    - Context homogenous with tubes.
      - Cystidia absent.
        - Pileus strongly hirsute ..... 8. *P. hirsutus*
        - Pileus tomentose or smooth.
          - Pileus strongly zoned ..... 9. *P. versicolor*
          - Pileus not or scarcely zoned .... 10. *P. adustus*
      - Cystidia present, hyaline ..... 11. *P. Braunii*

Context distinct from tube layer.
Context fleshy, tube layer subgelatinous..... 12. *P. dichrous*
Context and tubes fleshy-corky ..... ..... 13. *P. Eucalyptorum*
Spores strongly echinulate ..... ..... ..... ..... 14. *P. proprius*

Context ferruginous or umber.
Pileus silky on the surface ..... ..... ..... ..... 16. *P. tabacinus*
Pileus smooth or strigose-tuberculate.
Spores hyaline ..... ..... ..... ..... ..... 15. *P. gilvus*
Spores coloured ..... ..... ..... ..... ..... 17. *P. radiatus*

1. **Polyporus Berkeleyi** Fries, *Nov. Symb.*, p. 40, 1851.

*P. subgiganteus* Berk. et Curt., *Grev.*, vol. 1, p. 49, 1872.
*P. Dickensii* Berk., *Jour. Linn. Soc.*, vol. 16, p. 50, 1878.
*P. Beatiei* Peck, *Rept. N.Y. State Mus. Nat. Hist.*, vol. 30, p. 36, 1878.
*Polyporus lactifluus* Peck, *Bull. Torr. Bot. Cl.*, vol. 8, p. 51, 1881.
*P. anax* Berk., *Grev.*, vol. 12, p. 37, 1883.
*P. zelandicus* Cke., *Grev.*, vol. 16, p. 113, 1888.
*Grifola Berkeleyi* (Fr.) Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 337, 1904.

Pileus stipitate, compound, pileoli arising from a common base, irregular in size and shape, centrally or laterally stipitate, clavate, spathulate, fan-shaped, 6-20 x 1-15 x 0.3-3 cm., margins lobed, or deeply cleft into numerous sub-pileoli; surface fawn, fulvus or bay brown, finely tomentose or farinaceous, often rugulose and obscurely striate; context white to isabelline, firm, soft-punky, up to 2 cm. thick, sometimes staining orange when bruised; tubes cream to isabelline, sometimes staining orange when bruised, when old often bay brown or ferruginous, 1-2 mm. long, irregular in shape, polygonal, or more usually laterally compressed, 0.5-2 mm. diam., decurrent, dissepiments thin, often lacerate; cystidia absent; spores globose, hyaline, 6-8 mmm. diam. (including spines), strongly echinulate, abundant.

Habitat: At bases of trees growing in rich humus.
Base of *Nothofagus* sp. stump.
Arthur's Pass, Canterbury; 500m.; Feb., 1927; *J. B. Cleland!*
Base of *Dacrydium* sp. stump.
Mt. Egmont, Taranaki; 1000m.; Feb., 1927; *J. B. Cleland!*

Distribution: North America, Japan, Australia, New Zealand.

Separated from all other species present in New Zealand, save *P. proprius*, by the presence of the large, strongly echinulate, hyaline spores. The compound nature of the pileus also is characteristic.

The plant is exceedingly variable in its size and shape, as may be seen by the remarks of other workers, quoted below; consequently such characters as size, surface markings of the pileoli, and shape of the plant, cannot be considered specifically. Murrill (15), in discussing this plant, states " I have seen plants two feet in width and over a foot high, with several lobes six to nine inches in diameter.

They usually grow under oak trees, often between the enlarged bases of the main roots, and are in close connection with some supply of humus, either from buried wood or very rich leaf-mould." Lloyd (9, p. 36) gives the following particulars regarding the species: "We have a specimen in our museum. . . of the following dimensions when fresh: length, 3 feet; width, 2 feet 2½ inches; height, 1 foot 1 inch; weight, 43 lbs."

The New Zealand specimens at hand differ in that the pileoli are smaller and more lobed; but in all other particulars, nature and colour of the context, shape, colour and size of the tubes, and especially the spores, our plants agree very closely with authentic North American specimens of *P. Berkeleyi* in the writer's herbarium. To maintain the plant as specifically distinct on the smaller size and more lobed nature of the pileoli in such a variable species as this seems to be unnecessary, and would only tend to confusion. The species was previously described from New Zealand as *P. zelandicus;* according to Bresadola and Lloyd the type of this at Kew is identical with *P. Dickensii* from Japan. This in turn Lloyd considers to be a synonym of *P. Berkeleyi,* a belief the writer considers is substantiated by the fact that the specimens listed above do not materially differ, save in the points enumerated, from *P. Berkeleyi.*

2. **Polyporus Colensoi** Berkeley, *Fl. N.Z.*, vol. 2, p. 178, 1855. (Fig. 1.)

Pileus stipitate, compound, numerous pileoli arising from a common central or lateral, dichotomously branched stipe, whole plant compact, up to 20 cm. broad; pileoli small, 1-3 cm. broad, fan-shaped or cuneiform; exterior roughened, papillate-striate, dingy-grey to umber, margin entire, very thin; context thin, 1-2 mm., corky when dry, fleshy when fresh, isabelline; tubes decurrent, uneven, irregular in shape, hexagonal or elongate, sometimes sinuate, 1-3 mm. long, laterally compressed, dissepiments thin, often toothed; cystidia absent: spores globose to subglobose, 4-5.5 mmm. diam., hyaline, smooth, abundant.

Habitat: On clay soil at the base of trees in the forest.
York Bay, Wellington; Nov., 1921; *E. H. Atkinson!*

Distribution: ? Australia, New Zealand.

Characterized by the compound pileus, small fan-shaped pileoli, irregular toothed tubes, and subglobose, hyaline, smooth spores. It is separated from the preceding by the smaller pileoli and smooth spores; and from *P. anthracophilus* by the thin fleshy-corky nature of the context, much smaller pileoli and much larger diameter of the tubes.

3. **Polyporus anthracophilus** Cooke, *Grevillea*, vol. 12, p. 16, 1883. (Fig. 2.)

*Fomes anthracophilus* Cke., *l.c.*
*Polyporus rosettus* Lloyd., *Myc. Notes*, p. 601, 1916.

Pileus laterally stipitate, compound: pileoli variable in size and shape, fan-shaped, lobed and sub-lobed, margin toothed, up to 6 x 6 cm.; exterior minutely velutinate or farinose, sometimes tuberculose,

bay brown, umber or chocolate brown, radially obscurely sulcate and striate; context hard and woody, but thin, 0.5-2 mm., white or isabelline, sometimes with green or brown colour zones, brown beneath the cuticle; tubes uneven below, decurrent, isabelline, 1-4 mm. long, 4-6 to mm., irregularly labrynthiform, angular or round, dissepiments thin, often toothed, whole layer firm and tough; cystidia absent; spores subglobose to pip-shaped, 4-6 x 3-4 mmm., hyaline, smooth, abundant.

Habitat: Dead driftwood on river banks; bases of stumps of trees in the forest.

Palmerston North, Wellington; July, 1919; *G. H. C.*
Otaki Forks, Wellington; July, 1922; *E. H. Atkinson!*
Ashburton, Canterbury; Aug., 1925; *J. C. Neill!*

Distribution: Australia; New Zealand.

Characterized by the compound nature of the plant, the freely lobed, hard and woody pileoli, and smooth, hyaline spores. Lloyd has named part of the Otaki collection as *P. rosettus*, which according to Bresadola (3, p. 30) is a synonym of *P. anthracophilus*.

4. **Polyporus oblectans** Berkeley, *Linn. Jour. Bot.*, vol. 4, p. 51, 1845. (Fig. 3.)

*P. parvulus* Klotzsch, *Linnaea*, vol. 8, p. 483, 1833.
*P. bulbipes* Fr., *Nov. Symb.*, p. 72, 1851.
*P. splendens* Peck, *Ann. Rept. N.Y. St. Mus.*, vol. 26, p. 68, 1874.
*Polystictus cinnamomeus* Sacc., *Mich.*, vol. 1, p. 362, 1878.
*P. salpincta* Cke., *Grev.*, vol. 8, p. 142, 1880.
*Polyporus subsericeus* Peck, *Ann. Rept. N.Y. St. Mus.*, vol. 33, p. 37, 1880.
*P. perdurans* Kalch. et Cke., *Grev.*, vol. 9, p. 1, 1880.
*Polystictus oblectans* (Berk.) Cke., *Hdbk. Aus. Fungi*, p. 138, 1892.
*Coltricia cinnamomea* (Jacq.) Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 343, 1904.

Pileus stipitate, simple, orbicular, 2-3 cm. diam., plano-depressed, becoming umbilicate; surface bright cinnamon, seldom darker, shining, strigose-striate, at first zoned, becoming tawny and zoneless, margin fimbriate, sometimes lobed; context firm, tawny to umber, 0.5-2 mm. thick, coriaceous; stipe central, sometimes excentric, 2-3 cm. x 3-5 mm., bulbous at base or equal, silky or pruinose, solid; tubes decurrent, even, cinnamon or pallid umber, 1-2 mm. long, 2-3 to the mm., irregular in shape, margin often broadly sterile; cystidia absent; spores elliptical, 6-7 x 4-5 mmm., smooth, pallid yellow, abundant.

Habitat: On rotting buried sticks on the ground.

Sandhills, Weraroa, Wellington; Oct. 1919, 1920, 1922: *E. H. Atkinson!*

Distribution: Britain, Europe, North America, Tropical Asia, Australia, New Zealand.

Characterized by the bright cinnamon colour, usually central stipe (excentric in several specimens at hand), small tawny tubes, and pale yellow, smooth, elliptical spores. It resembles in general appearance the following species, but is readily separated by the

cinnamon, shining, strigose-striate surface of the pileus and much smaller tubes.

Considerable confusion exists in literature as to the specific name to be applied to this species. Lloyd (7, p. 7), in comparing *P. oblectans* with the American form (which he considered specifically distinct and labelled *P. cinnamomeus*) stated: ". . . In the American plant the fibrils of the pileus are appressed and the pileus smooth. In the Australian plant the fibrils in the centre of the pileus are *erect* and the pileus subsquamous. In addition the spores of the Australian plant are more round being about 6 x 7 mmm." As to the erect fibrils, this feature is present or absent in different plants in the collections listed above, so cannot be considered as being of specific value. Their presence would appear to depend on the age of the plants when collected as they are usually in evidence in young plants, but absent in older and fully matured specimens. The spores in the New Zealand plants are 6-7 x 4-5 mmm.; and according to Murrill (16, p. 92) those of the American plants are 6-8 x 4-6 mmm. Rea (17, p. 575), records them from England as being 6-7 x 4-5 mmm., so that Lloyd's record for the American plant "varying from 5 x 6 to 6 x 10 mmm." is apparently based on faulty measurement. It will thus be seen that the spores of the New Zealand and Australian forms (for Cleland and Cheel (4, p. 492) record them from Australia as being 7-7.3 x 5.2 mmm.) are the same as the European and North American forms; therefore as both distinctions as drawn by Lloyd disappear, it is evident the Australasian plant is the same as the one occurring elsewhere.

The specific name *cinnamomeus*, commonly applied to this plant, cannot be used for it antedates the starting point of modern nomenclature in the Polyporaceae (6), and was not used specifically by Fries himself. The second name *parvulus* applied to the species by Klotzsch cannot be used, as it was applied to a different plant the previous year by Schweinitz; therefore *oblectans*, being next in order, is the specific name to be applied to this species.

5. **Polyporus arcularius** (Batsch) Fries, *Syst. Myc.*, vol. 1, p. 342, 1821. (**Fig. 4.**)

*P. alveolaris* Bosc ex Fr. *Epi.*, p. 431, 1838.
*P. agariceus* Berk., *Ann. Mag. Nat. Hist.*, vol. 10, p. 371, 1842.
*Favolus Curtisii* Berk., *Grev.*, vol. 1, p. 68, 1872.
*F. squamiger* Berk., *Jour. Linn. Soc.*, vol. 13, p. 166, 1872.
*Polyporus collybioides* Kalch., *Grev.*, vol. 10, p. 94, 1881.
*Leucoporus arcularius* (Batsch) Quel., *Fl. Fr.*, vol. 1, p. 402, 1888.
*Polyporus Penningtonii* Speg., *Myc. Argent.*, ser. 2, p. 52, 1902.
*P. arculariellus* Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 36, 1904.
*P. arculariformis* Murr., *Torreya*, vol. 4, p. 151, 1904.

Pileus stipitate, simple, orbicular, 4-8 cm. diam., convex, then plane, usually umbilicate, at first fleshy, becoming coriaceous; exterior at first squamulose, becoming smooth and fuscus, margin finely tomentose, fimbriate or smooth, even, variegated; context thin, 0.1-1 mm., white, drying isabelline, firm and membranous; stipe 5 cm. x 3-6 mm.,

concolorous, squamulose, hollow or stuffed; tubes even, decurrent, concolorous, elongate or compressed polygonal, 2-3 x 0.5-1.5 mm., dissepiments thin, entire; cystidia absent; spores elliptical, often slightly allantoid, 6-8 x 2-3.5 mmm., hyaline, smooth, abundant.

Habitat: On dead wood lying on the surface of pastures near margins of the forest.

Weraroa, Wellington; Oct. 1919; *E. H. Atkinson—G.H.C.* (two abundant collections).

Distribution: England, Europe, North America, Australia, New Zealand.

One of the finest plants of the genus, characterized by the simple stipe, orbicular, usually umbilicate, dark-coloured pileus, and compressed-hexagonal, large decurrent tubes. It varies considerably, particularly in the colour and degree of roughness of the pileus, and size and shape of the tubes.

What appears to be an extreme form, known as *P. brumalis*, is often confused with this species. Apparently separation is possible only on the larger, more irregular tubes of *P. arcularius*, but intermediate forms are common elsewhere making separation in such cases a difficult matter. (See, for example, Lloyd's remarks re "The named and misnamed species of the Exsiccatae," *Letter 52*, p. 6).

The spores in both species are the same size, yet Rea (17, p. 576) gives those of *P. arcularius* as being globose and 3 mmm. diameter!

The plant is abundant in New Zealand, and also in Australia, according to Cleland and Cheel (4, p. 497); *P. brumalis*, on the other hand, has not been collected in Australasia (save for one reference by Cooke in the *Handbook*, p. 112, most probably misdetermined).

6. **Polyporus catervatus** Berkeley, *Fl. N.Z.*, vol. 2, p. 180, 1855. (Fig. 5.)

*Polystictus catervatus* (Berk.) Sacc. *Syll. Fung.*, vol. 6, p. 289, 1888.

Pileus apparently inverted, saucer-shaped or disciform, 0.1-1 cm. diam., caespitose, when forming masses up to 5 cm. across, attached by a central, basal, stipe-like projection; exterior finely tomentose, radially striate, pallid isabelline, fuscus when old; context thin, 0.5 mm. or less, isabelline, fleshy; tubes apparently superior, actually ventral, ochraceous or dingy-brown, even, margin broadly sterile, 1-3 mm. long, 10 or more to the mm., irregular in shape, often laterally crushed; cystidia absent; spores globose, 4-5 mmm., hyaline, smooth, abundant.

Habitat: On the under side of fallen logs in the forest.

Weraroa, Wellington; Sept. 1919; *G.H.C.*

May 1923; *J. C. Neill—G.H.C.*

Distribution: Endemic.

One of the most unique species of the genus, which could be made the type of a "new genus." In herbarium specimens the plant appears like the stalked apothecium of a *Sclerotinia*, the saucer-shaped portion being occupied by the tube-layer. It grows on the

under side of logs, so that the hymenium is really ventral, but unless specimens were seen growing *in situ,* it would appear to be superior. The plant often appears to be of irregular size, through several pilei becoming united at their margins, but their individual structure is always apparent, owing to the junction between pilei being quite visible, and to the fact that each possesses its small stipe. The tubes are so minute as to be seen clearly only with a lens; so possibly the species may have been described also as a *Stereum.*

From the description given by Berkeley, it would be impossible to place the plant, nor would reference to the type aid diagnosis, as according to Bresadola (2, p. 240): "Specimen Colensoi valde dubium, imperfectum, indeterminable; specimen Traversii est = *P. concrescens* Mont." Fortunately Berkeley illustrated the species (*l.c.*, pl. CV., f. 1), and as will be seen by our photograph our plant agrees exactly with Berkeley's illustration; hence despite the absence of a recognisable type the name can be applied to the collections at hand with confidence.

Only one other plant has a similar pendulous habit, namely *P. dependens,* but this differs in the coloured spores, large diameter of the tubes, and different colour and shape of the pileus. *P. catervatus* is not related to any of the plants described in this paper, but is placed in its present position solely on account of the presence of a central, simple stipe, if this structure can be termed such.

7. **Polyporus melanopus** (Schwarz) Fries, *Syst. Myc.*, vol. 1, p. 347, 1821. (Figs. 6, 7.)

*P. flavescens* Rostk., in Sturm *Deut. Fl.*, vol. 4, t. 15, 1838.
*P. leprodes* Rostk., *l.c.*
*P. infernalis* Berk., Hook. *Jour. Bot.*, vol. 2, p. 637, 1843.
*P. versiformis* Berk., *Ibid.*, vol. 4, p. 137, 1852.
*P. Pancheri* Pat., *Bull. Soc. Myc. Fr.*, vol. 3, p. 168, 1887.
*Melanopus melanopus* (Schwarz) Bourd. et Galz., *Bull. Soc. Myc. Fr.*, vol. 41, p. 112, 1925.

Pileus stipitate, infundibuliform, or less commonly spathulate, up to 10 c.m. across, upturned when young, frequently incurved when old, margin entire or coarsely lobed; exterior at first minutely squamulose, becoming glabrous, often with scattered, minute, raised radial striae, pallid yellow to umber (colour depending on age of specimens); stipe central or excentric, solid, bay brown to black, covered with a thickened cuticle (which is often absent), 2-5 cm. x 1-8 mm., curved, unequal, usually thickened downwards, often minutely velvety; context tough, coriaceous, 1-2 mm. thick, isabelline; tubes decurrent, white, becoming isabelline, even, margins sterile, orifices often velutinate, angular, 6-8 to mm.; cystidia absent; spores elliptical, 6-8 x 2-3.5 mmm., hyaline, smooth, abundant.

Habitat: On rotting branches lying on the forest floor.
Weraroa, Wellington; Jan. 1920; *G.H.C.*; June 1923, *J. C. Neill—G.H.C.*
Distribution: Britain, Europe, Australia, New Zealand.

Characterized by the frequent infundibuliform shape of the pileus, the prominent, black stipe, often with a distinct cuticle covering the base, and thin, coriaceous context.

The plant is one of a small series of closely related forms or species. Considerable confusion exists in literature as to the limits of these, and it appears to the writer, that two recognizable species only occur, the many others being but variants of these. That this confusion is evident will be made clear by the following example. Part of one collection was sent abroad to one authority, who named it *P. infernalis;* part of the same collection, sent to a second authority was named *P. dictyopus*; yet a third sending of the same collection was named by a third authority *P. melanopus.* If material and "authorities" had held out, doubtless a considerable number of names would have been accumulated! Thus three "species" are present, in one collection, taken at the same time from the same log. Reference to available literature has not tended to clarify the position; for example, Lloyd (10, p. 180) states that *P. infernalis* is a synonym of *P. dictyopus,* which in turn he considers a form of *P. varius-picipes*; and *P. picipes* he considers a form of *P. varius.* By Bourdot and Galzin (1, p. 110) *P. picipes* is considered a synonym of *P. varius. P. elegans,* a form considered a form of *P. varius* by Lloyd, is considered a valid species by Bourdot and Galzin, yet by Rea (17, p. 577) is considered a synonym of *P. varius.*

Comparison of our material with herbarium material from abroad shows that certain plants are identical in every particular with *P. melanopus,* so this name is used for the collections in question, a name which has previously been used by Massee (14, p. 5) for plants from New Zealand. *P. infernalis,* judging from descriptions, does not appear to differ in any particular, so is here considered as a synonym. *P. dictyopus* appears to be quite a different plant, and if not a valid species, is a form of *P. varius. P. Pancheri* is a form with radial striae on the pileus, a character which appears to be accidental, as it occurs on certain of the plants at hand. It is referred by Lloyd to *P. dictyopus,* and according to him, by Kew authorities to *P. infernalis.* But Bresadola (2, p. 226) refers it as a synonym of *P. versiformis* Berk., which according to Lloyd (10, p. 188) is based on "two little specimens, one of which seems to be *P. melanopus,* the other I think different."

As to the differences between *P. varius* and *P. melanopus*: in literature these are not clearly defined, but from herbarium specimens the writer believes the two differ in the thickness and nature of the context, the former possessing a woody consistency, the latter being more coriaceous, thinner and usually of a different shape. The presence or absence of the black stipe, or whether it is velutinate or glabrous, cannot be considered as of much value, for in the collections at hand, occur forms with and without these characters. Some, taken from the same log, have ochraceous stipes, others have black; some are velutinate, others glabrous; still others possess a distinct cuticle covering the stipe, and this may in turn be velutinate or glabrous, black or ochraceous.

*P. melanopus* is another plant not related to any others present in the Dominion, yet placed in its present position on account of the presence of a definite stipe.

8. **Polyporus hirsutus** Fries, *Syst. Myc.*, vol. 1, p. 367, 1821. (Fig. 8.)

*Polystictus hirtellus* Fr., *Nov. Symb.*, p. 83, 1851.
*P. hirsutus* Fr., *l.c.*, p. 86.
*Coriolus hirsutus* Quel., *Fl. Myc.*, p. 389, 1888.
*C. nigromarginatus* (Schw.) Murr., *Bull. Torr. Bot. Cl.*, vol. 32, p. 649, 1906.
*Polystictus hirsutellus* Lloyd, *Letter 67*, p. 2, 1918; *nomen nudum.*

Pileus sessile, dimidiate, imbricate, often resupinate, at first soft and flexible, becoming thin, tough and coriaceous; surface strongly hirsute, of green, grey or brown concentric zones; context thin, 1-2 mm., white, becoming isabelline, corky; tubes even, grey to cinnamon, usually round, sometimes daedaloid, occasionally stratose, 3-4 to mm., 1-2 mm. long, margin sterile, dessipiments thin, entire; cystidia absent; spores cylindrical, 6-9 x 2,5-3.5 mmm., hyaline, smooth, abundant.

Habitat: On dead wood, sticks, etc., in damp places, as rubbish tips.
Weraroa, Wellington; Aug., Sept., 1919; *G.H.C.*
Kelburn, Wellington; Nov., 1926; *G.H.C.*
Marton, Wellington; Feb., 1927; *G.H.C.*
Distribution: Britain; Europe; Asia; America; Australia; New Zealand.

Characterized by the coriaceous, dimidiate pileus, hirsute, zoned surface, usually pallid colour of the tube layer, and cylindrical, hyaline spores.

The plant may be collected throughout the year on rotting branches and the like in damp places, as rubbish heaps; on these it produces a rapid white rot, irrespective of the host. In the plants from Marton, the pilei show the tubes to be in definite strata, like a *Fomes*, with layers of context between each stratum. It is evident that with these specimens, fresh pilei have grown over the old. It is such plants that tend to break down the division between *Polyporus* and *Fomes*; this peculiarity is apparently not rare, as it has been commented on by Lloyd (13). In certain plants, there is a tendency also for the proximal ends of the tubes to penetrate different depths into the context, the chief character of *Trametes*. Thus extreme forms of the plant could be placed equally well in either *Trametes* or *Fomes*.

The species closely resembles the following in structure, from which it may be separated by the strongly hirsute surface of the pileus.

9. **Polyporus versicolor** (L.) Fries, *Syst. Myc.*, vol. 1, p. 368, 1821. (Figs. 9, 11.)

*P. decipiens* Schw., *Trans. Am. Phil. Soc.*, p. 157, 1834.
*P. poecilus* Berk., *Ann. Mag. Nat. Hist.*, vol. 10, p. 372, 1842.
*Polystictus versicolor* (L.) Fr., *Nov. Symb.*, p. 86, 1851.
*P. azureus* Fr., *l.c.*, p. 93.
*P. apophysatus* (Rostk.) Fr., *Hymen. Eur.*, p. 580, 1874.
*Coriolus versicolor* (L.) Quel., *Ench. Fung.*, p. 175, 1886.
*Polystictus decipiens* (Schw.) Sacc., *Syll. Fung.*, vol. 6, p. 262, 1888.
*P. aequus* Lloyd, *Myc. Notes*, p. 933, 1920.

Pileus dimidiate, imbricate, thin, gibbous or fan-shaped, when attached by a narrowed base, 2-10 cm. across; exterior smooth or more often finely pubescent with yellow or brown satiny zones alternating with smooth, or of zones of various colours as brown, blue, green or yellow; context thin, 0.5-2 mm., white or isabelline, compact: tubes even, 1-2 mm. long, about 4 to the mm., white, becoming isabelline, dissepiments thin, often toothed; cystidia absent; spores elliptical or cylindrical, 5-8 x 2-3 mmm., hyaline, smooth, abundant.

Habitat: On dead branches and stumps of trees.
Dead *Pinus radiata* stump.
Masterton, Wellington; Nov., 1919; *G.H.C.*
Dead *Prunus persica* branches.
Henderson, Auckland; Nov., 1920; *F. Moore!*
Dead *Acacia* stumps.
Ashburton, Canterbury; Aug., 1925; *J. C. Neill!*
Christchurch, Canterbury; Oct., 1922; *W. K. Dallas!*
Riccarton, Canterbury; Dec., 1925; *D. W. McKenzie!*
Tauranga, Auckland; Jan., 1924; *G.H.C.!*
Dead *Nothofagus* sp. log.
Mt. Waiopehu, Wellington; Oct., 1919; *G.H.C.*
Upright of old whare (timber unknown).
Clinton Valley, Otago; Jan., 1920; *E. H. Atkinson!*
Host unknown.
Bealey Gorge, Canterbury; 1881; *T. Kirk!*

Distribution: World-wide.

A polymorphic species, exhibiting so many variations that it is impossible to list them. All New Zealand collections are considered to belong to *P. versicolor*, though they vary to such an extent that many extreme forms cannot be differentiated from the closely related *P. zonatus* Fr., a " species " which the writer considers is not specifically distinct, but in the absence of authentic specimens, *P. zonatus* is not listed as a synonym. Bourdot and Galzin (1, p. 141) consider that *P. zonatus* is rare and typical only on the " tremble " (*Populus tremula*), on which host specimens have not been collected in New Zealand.

The species is also closely related to *P. hirsutus*, but may be separated by the velutinate, usually markedly zoned pileus, and by the frequent lobed dissepiments, a feature which does not occur with *P. hirsutus*.

*P. velutinus* so closely resembles *P. versicolor* that it is also often difficult to separate them; consequently the record of this species occurring in New Zealand given by Massee (14) is considered to be based on a misdetermination of *P. versicolor*. Bourdot and Galzin (1, p. 139) consider *P. velutinus* a synonym of *P. pubescens* Fr.

*P. versicolor* has proved a serious disease of peach-trees in the Auckland Province, producing a condition not unlike that caused by *Stereum purpureum*.

10. **Polyporus adustus** (Willd.) Fries, *Syst. Myc.*, vol. 1, p. 363, 1821. (Fig. 10.)

*P. crispus* Fr., *Obs. Myc.*, vol. 1, p. 127, 1815.
*P. pallescens* Fr., *Syst. Myc.*, vol. 1, p. 369, 1821.
*P. subcinereus* Berk., *Ann. Mag. Nat. Hist.*, vol. 3, p. 391, 1839.
*P. demissus* Berk., *Hook. Jour. Bot.*, vol. 4, p. 52, 1845.
*P. Halesiae* Berk. et Curt., *Ann. Mag. Nat. Hist.*, vol. 12, p. 434, 1853.
*P. Lindheimeri* Berk. et Curt., *Grev.*, vol. 1, p. 50, 1872.
*P. scanicus* Fr., *Hymen. Eur.*, p. 349, 1874.
*Polystictus adustus* Fr., *Hymen. Eur.* p. 549, 1874.
*Polyporus dissitus* Berk. et Br., *Jour. Linn. Soc.*, vol. 14, p. 48, 1875.
*P. gloeoporioides* Speg., *Mich.*, vol. 1, p. 231, 1878.
*Bjerkandera adusta* (Willd.) Karst., *Medd. Soc. Finl. Fl. Fenn.*, vol. 5, p. 38, 1879.
*Polyporus MacOwani* Kalch. et Cke., *Grev.*, vol. 10, p. 54, 1880.
*Myriadoporus adustus* Peck, *Bull. Torr. Bot. Cl.*, vol. 11, p. 27, 1884.
*Leptoporus adustus* (Willd.) Quel., *Fl. Myc.*, p. 388, 1888.
*Polystictus similans* (B. et C.) Sacc., *Syll. Fung.*, vol. 6, p. 117, 1888.
*Polyporus Burtii* Peck, *Bull. Torr. Bot. Cl.*, vol. 24, p. 146, 1897.

Pileus sessile, dimidiate, imbricate, often completely resupinate, 2-8 cm., often forming diffused areas up to 20 cm. long; exterior even, finely villose, frequently zoned, often rugulose; context white or greyish, corky, firm, 0.5-3 mm. thick; tubes even cinereus, 0.2-2 mm. long, often mere pits in the surface, margin broadly sterile, 4-5 to mm., dissepiments thin, firm, entire; spores elliptical, 4-6 x 2-3 mmm., hyaline, smooth, abundant.

Habitat: Dead wood, sticks and the like, on the forest floor. Palmerston North, Wellington; May, 1919; *G.H.C.* Weraroa, Wellington; Aug., 1919; *G.H.C.*

Distribution: Britain; Europe; India; North America; Australia; New Zealand.

The smoky-grey, short tubes and effused-reflexed pileus are the characters of the species. It varies considerably, hence the numerous synonyms. Most of the New Zealand plants are resupinate, but in the herbarium are European and North American plants typically dimidiate and imbricate.

The three preceding species, *P. hirsutus*, *P. versicolor* and *P. adustus* are structurally related, and form a natural group, characterized by the dimidiate habit, white or isabelline coriaceous context, and hyaline smooth spores.

11. **Polyporus Braunii** Rabenhorst, *Fung. Eur.* no. 2005, 1824.

*P. rufoflavus* Berk. et Curt., *Jour. Linn. Soc.*, vol. 10, p. 310, 1868.

*Fomes rufoflavus* (B. et C.) Sacc., *Syll. Fung.*, vol. 6, p. 191, 1888.

*Polystictus Braunii* (Rab.) Sacc., *l.c.*, p. 289.

*Polyporus Engelii* Harz., *Bot. Centr.*, vol. 1, p. 376, 1889.

*Polystictus Engelii* (Harz.) Sacc., *Syll. Fung.*, vol. 9, p. 188, 1891.

*Fomes Braunii* (Rab.) Bres., *Attl. Lett. Art. Ag. Rov.*, ser. 3, vol. 3, p. 74, 1897.

*Leptoporus Braunii* (Rab.) Pat., *Ess. Tax. Hymen.*, p. 85, 1900.

*Flaviporus rufoflavus* (B. et C.) Murr., *Bull. Torr. Bot. Cl.*, vol. 32, p. 360, 1905.

Pileus dimidiate, applanate, often resupinate, 0.5 x 1-3 x 0.2-0.5 cm.; surface rugulose, glabrous or finely tomentose, sometimes zoned; context fleshy, becoming horny, thin, 0.2-0.5 mm., pallid yellow; tubes even, irregular in shape, 8-11 to mm., pallid lemon yellow, sometimes stratose, dissepiments very thin, entire; cystidia hyaline, encrusted-tuberculate, hollow, 32 x 8 mmm., inserted at an acute angle with apices downwards; spores obovate, 2-2.5 x 1-1.5 mmm., hyaline, smooth, abundant.

Habitat: On dead wood in the forest.
Weraroa, Wellington; July, 1919; *G.H.C.*

Distribution: Cuba; Venezuela; Ceylon; Borneo; Malacca; Europe; New Zealand.

A minute plant, characterized by the pallid-yellow colour of the context and tube layer, and especially by the large, hyaline, encrusted cystidia and minute hyaline spores. The New Zealand collections possess a single layer of tubes, but in certain European collections they occasionally occur in strata, and in consequence the species has by several authorities been referred to *Fomes*. This is one of those examples in which a plant normally of the *Polyporus* type, occasionally assumes a *Fomes* form; in such cases it appears that other characters must be considered before its generic position can be determined. As the plant has the fleshy context and structure of *Polyporus*, it is therefore referred to this genus, more especially as the tubes are not in strata in the collections at hand. The cystidia—characteristic of the species—are unlike any the writer has encountered in other species of the family, but resemble those present in European collections of *Poria eupora*.

The distribution of the plant, as given by Bourdot and Galzin (1, p. 133) is peculiar, for it has been recorded from Borneo, Ceylon, Cuba, Malacca, Venezuela, and in addition in Belgium, Germany, Italy, and the mines of Hungary and Saxony.

It is not related to any species of the genus considered in this paper, differing especially in the peculiar cystidia and minute spores, but is placed in its present position more as a matter of convenience in that it possesses a pallid context and hyaline smooth spores.

12. **Polyporus dichrous** Fries, *Syst. Myc.*, vol. 1, p. 364, 1821. (Fig. 12.)

*P. nigropurpurascens* Schw., *Trans. Am. Phil. Soc.*, p. 360, 1834.
*Poria cruentata* Mont., *Ann. Sci. Nat.*, ser. 3, vol. 16, no. 362, 1851.
*Gloeoporus candidus* Speg., *Anal. Soc. Cien. Arg.*, vol. 16, no. 56, 1883.
*Polyporus Curreyanus* Berk. in Herb.; Cke., *Grev.*, vol. 15, p. 20, 1886.
*Leptoporus dichrous* (Fr.) Quel.; *Fl. Myc.*, p. 388, 1888.
*Gloeoporus dichrous* (Fr.) Bres., *Hedw.*, vol. 53, p. 74, 1914.

Pileus effused-reflexed, dimidiate, often imbricate, frequently resupinate, often laterally confluent when covering considerable areas; 1-3 x 2-15 cm. x 1-4 mm.; surface tomentose, often spongy, obscurely zoned, white, becoming dingy cream to isabelline or even darker, margin smooth and more pallid; context white to pallid ochraceous, thin, 0.5-2 mm., soft but firm; tubes and subhymenial tissue distinct from the context, soft gelatinous and readily peeling away in fresh specimens, hard, horny and darker in colour when old, at first white and translucent, changing to flesh colour (save for the more pallid, sterile margins) at maturity; in old specimens often dark reddish or purple-brown, subglobose, 4-6 to mm.; cystidia absent; spores cylindrical, often allantoid, 4-6 x 1-1.5 mmm., hyaline, smooth, abundant.

Habitat: On dead wood and stumps in the forest.
Weraroa, Wellington; July, Sept., 1919; *G.H.C.*
Weraroa, Wellington; May, 1925; *J. C. Neill!*
Riccarton, Canterbury; Jan., 1927; *D. W. McKenzie!*
Distribution: Europe; North and South America; South Africa; Japan; Australia; New Zealand.

An abundant species with a penchant for growing on decayed upright stumps, burnt logs and the like in recent forest clearings over which fire has been passed. Although not readily noticeable in dried material, the whole tube layer is markedly distinct from the context. In fresh plants it is quite gelatinous, and may be peeled readily from the context. On account of this diverse nature of the tube layer, the genus *Gloeoporus* is maintained by certain workers, containing this and several related species. Although a good generic character, it has not been considered advisable to separate this under a distinct genus from the few species of *Polyporus* known to occur in New Zealand, as thereby classification is simplified. It will suffice, in this paper at least, to call attention to this feature, and to the fact that the plant is by many placed in *Gloeoporus*.

Alhough abundant in the Dominion, it appears to be rare in Australia, for Cleland and Cheel (4, p. 530) record but one collection in their possession; and according to Lloyd, though abundant in the United States, it is rare in Europe.

It is one of the anomalous species which has no close relationship with other species of the genus, and is therefore placed in the present position because of its dimidiate, often imbricate nature, light colour of the context, and smooth hyaline spores.

13. **Polyporus Eucalyptorum** Fries, *Pl. Preiss,* vol. 2, p. 135, 1847. (Figs. 13-15.)

*P. hololeucus* Kalch., *Hedw.,* vol. 15, p. 114, 1876.
*P. leucocreas* Cke., *Grev.,* vol. 8, p. 55, 1879.
*Polystictus hololeucus* (Kalch.) Sacc., *Syll. Fung.,* vol. 6, p. 241, 1888.
*? Polyporus Hauslerianus* P. Henn., *Hedw.,* vol. 35, p. 305, 1895.
*P. spermolepidis* Pat., *Bull. Soc. Myc. Fr.,* vol. 14, p. 153, 1898.
*Xylostoma gigantea* Cheel, *Proc. Linn. Soc. N.S.W.,* vol. 35, p. 308, 1910.
*Polyporus maculatissimus* Lloyd, *Myc. Notes,* p. 1113, 1922.

Pileus ungulate, often bell-shaped, sometimes applanate, attached by an elongate, lateral or apical, stipe-like base, up to 20 cm. diam., irregular in size and shape; exterior covered with a thin, tough, honey-coloured or umber, minutely villose cuticle, which may be even, obscurely radially and concentrically zoned, or broken up into irregular squamules; context snow white when fresh, isabelline when old, soft, punky-friable and brittle; tubes even, honey coloured or reddish-brown (depending on the age of specimens), distinct and readily separable from the context, 1-3 to mm., angular, dissepiments thin, entire; cystidia absent; spores subglobose, 7-8 x 6-7 mmm., hyaline, smooth, abundant.

Habitat: On living *Nothofagus fusca* trunks.
York Bay, Wellington; July, Sept., 1921; Apl., 1926; *G.H.C.*
Day's Bay, Wellington; Nov., 1926; *D. W. McKenzie!*
State Forest Reserve, Rotorua, Auckland; *Unknown Collector!*

Distribution: Australia; New Zealand.

The largest species of the genus present in New Zealand. It may readily be recognized by the large extent of white, punky context, the readily separable tube layer, and large hyaline, smooth spores. In certain Australian forms, according to Cleland and Cheel (4, p. 523), the spores are slightly larger.

The plant is strictly an annual, and falls from the tree to the ground shortly after it has reached maturity. There it becomes waterlogged, discoloured, and may readily be mistaken for quite a different species. Although placed in the sessile section, the plant usually possesses a short, stipe-like projection serving as a point of attachment. If this structure is lateral, the plant often appears applanate, if apical it assumes a bell-shaped appearance, or if pressed against the trunk of the host, it becomes ungulate. The margins may be entire or even, lobed or crenulate. The surface, also, is by no means constant, and may be smooth, squamulose, or tomentose, and range in colour from

honey-yellow to umber, according to age. It is the cause of a serious heart-rot of beech (*Nothofagus* spp.) in the Wellington Province.

According to Lloyd (12, p. 298) the species closely resembles *P. betulinus,* so much so that separation is possible only on the characters of the spores, those of the latter being cylindrical, 6 x 2.5 mmm., whereas those of *P. Eucalyptorum* are subglobose, 7-8 x 6-7 mmm. Judging from the description, such as it is, *Polyporus Hauslerianus* might be a synonym of this species, though listed by Lloyd as a *Fomes.*

*P. Eucalyptorum* is not related to any other species of the genus present in New Zealand, but is placed in its present position because of the white context, hyaline smooth spores, and readily separable tube layer. In this last character it resembles *P. dichrous,* but the resemblance is slight, for although in both the tubes are separable from the context, in *P. dichrous* they are of an entirely different consistency, whereas in *P. Eucalyptorum* they are of similar consistency to the context.

14. **Polyporus proprius** Lloyd, *Myc. Notes,* p. 1328, 1924. (Figs. 16, 17.)

Pileus applanate, dimidiate, imbricate, 7-10 x 8-12 x 1-2.5 cm.; surface pallid yellow brown, or yellowish, obscurely zoned or not, radiately sulcately grooved, or not, areolate, tuberculate, delicately tomentose or pruinose, margin even, thick, (5 mm.) rounded; context isabelline, 10 mm. thick, hard and tough, compact; tubes very short, 0.5-1 mm., concolorous, 2-3 to mm., margin sterile, isabelline, angular, oval or round, dissepiments thick, entire, hard and firm; cystidia absent; spores subglobose, hyaline, 5-7 x 5-6 mmm., coarsely echinulate, abundant.

Habitat: On dead upright stumps in the forest.
Botanical Gardens, Wellington; March, 1927; *G.H.C.*

Distribution: Endemic.

A species readily recognized by its growth habit, and especially by the hyaline verruculose spores, and thick dissepiments of the short tubes. The colour, too, is characteristic.

The spores closely resembles those of *P. Berkeleyi,* but the plant is separated from this species by its sessile nature, and especially by the different tubes; in *P. Berkeleyi* they are laterally compressed and with thin dissepiments. Apart from its sessile habit, it is most closely related to *P. Berkeleyi* in the colour and structure of the context and nature of the spores, thus tending to show that separation of species on the presence or absence of a stipe is purely artificial, and does not show structural relationships.

15. **Polyporus gilvus** (Schweinitz) Fries, *Elench. Fung.,* p. 104, 1828. (Fig. 18.)

*Boletus gilvus* Schw., *Schr. Nat.-Ges. Leipzig,* vol. 1, p. 96, 1822.

*Polyporus holosclereus* Berk., *Ann. Nat. Hist.,* vol. 3, p. 324, 1839; non Fries 1838.

*P. cupreus* Berk., *Ann. Nat. Hist.,* vol. 3, p. 393, 1839.

*P. omalopilus* Mont., *Pl. Cell. Cuba.*, p. 423, 1842.
*P. inamomeus* Mont., *Ann. Sci. Nat.*, ser. 2, vol. 18, p. 20, 1842.
*P isidioides* Berk., Hook. *Jour. Bot.*, vol. 2, p. 415, 1845.
*Trametes pertusa* Fr., Wahl. *Fungi Natal.*, p. 10, 1848.
*Polyporus carneofulvus* Berk. ; Fr., *Nov. Symb.*, p. 68, 1851.
*P. Laurencii* Berk., *Fl. Tas.*, vol. 2, p. 254, 1860.
*P. ilicincola* Berk. et Curt., *Grev.*, vol. 2, p. 35, 1873.
*P. breviporus* Cke., *Grev.*, vol. 12, p. 7, 1883.
*P. Balsamae* Speg., *Anal. Soc. Cient. Arg.*, vol. 16, No. 42, 1883.
*Polystictus purpureofuscus* Cke., *Grev.*, vol. 15, p. 24, 1886.
*Placodes fucatus* Quel., *Ass. Fr.*, p. 4, 1886.
*Fomes inamomeus* (Mont.) Sacc., *Syll. Fung.*, vol. 6. p. 191, 1888.
*F. holosclereus* (Berk.) Sacc., *l.c.*, p. 193.
*F. rubiginosa* (Berk.) Sacc., *l.c.*, p. 194.
*Polystictus cupreus* (Berk.) Sacc., *l.c.*, p. 272.
*P. Balsamae* (Speg.) Sacc., *l.c.*, p. 277.
*Fomes homalopilus* (Mont.) Sacc., *l.c.*, p. 204.
*Polyporus aureomarginatus* P. Henn., *Bot. Jahrb.*, vol. 22, p. 72, 1895.
*Phellinus gilvus* (Schw.) Pat. *Essai Tax. Hymen.*, p. 82, 1900.
*Hapalopilus gilvus* (Schw.) Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 418, 1904.
*Polyporus pseudogilvus* Lloyd, *Myc. Notes*, p. 940, 1920.
*Fomes gilvus* Lloyd, *Myc. Notes*, p. 1157, 1922.
*Polyporus gilvo-rigidus* Lloyd, *Myc. Notes*, p. 1334, 1925.

Pileus applanate, dimidiate, sometimes imbricate, 2-7 x 5-12 x 0.5-2 cm.; surface bay to umber, obscurely zoned, radially striate, covered with rough hispid hairs, sometimes spongy-nodose, with a broad, almost glabrous margin, which is thin, entire, and not or only slightly incurved when dry; context fulvus to ferruginous, 2-6 mm. thick, sometimes obscurely zoned, tough and sub-woody; tubes ferruginous to cinnamon, often stuffed, 2-10 mm. long, sometimes stratose, when with layers of context between strata, deep ferruginous to umber below, 4-8 to mm., round or angular, dissepiments thin and entire; setae abundant, ventricose, acuminate, chestnut brown; spores elliptical or obovate, 4-5 x 2.5-3.5 mmm., hyaline, smooth, sparse.

Habitat: On fallen trunks in the forest.
Weraroa, Wellington; Sept. 1919; *G.H.C.*: May 1923; *J. C. Neill—G.H.C.* (3 abundant collections).
Lake Horowhenua, Wellington; May 1919; *G.H.C.*
Hokitika, Westland; Apl. 1923; *F. J. Perham!*
Invercargill, May 1924; *J. B. Cleland!*

Distribution: Britain; Europe; North and South America; Tropics generally; Australia; New Zealand.

Characterized by the applanate shape, fulvus or ferruginous context, abundant coloured setae and hyaline spores.

Probably this species is one of the most frequently misnamed in literature, as the synonymy shows. It varies to a considerable extent, particularly in the characters of the surface, ranging from smooth to

strongly hirsute and tuberculate forms; but as all intermediate stages are now known, it is not possible to maintain most of these, even as forms.

One of the chief characters of the species is its hyaline spores. Yet although hyaline spores are present in all the New Zealand collections, these have when sent abroad, been referred to *P. fulvomelleus*, a plant with coloured spores.

Furthermore, in certain localities, chiefly the Tropics, the tubes occasionally become stratose, when the plant becomes a *Fomes*, a condition present in several specimens at hand. And structurally it could be equally well be placed in *Fomes*, as it possesses many characters in common with species of this genus, as the hard and subwoody nature of the context, applanate shape, and ventricose setae. But this arrangement could be equally well applied to *P. radiatus*, which to the writer's knowledge, does not at any time have its tubes in strata. As the plant is almost universally referred to *Polyporus*, the writer has also placed it under this genus. Such forms tend to confirm the belief that *Fomes* should be absorbed under *Polyporus*, or else maintained on other characters.

Cleland and Cheel (4, p. 534) record this species for Australia, but note that the spores are yellow-brown. Although their collections have been named by Lloyd, it is evident their species is *P. fulvomelleus*, for this species is separated only on the coloured spores, in all other characters strongly resembling certain forms of *P. gilvus*. The plant has recently been collected in Western Australia by Mr. W. Carne, who has kindly forwarded specimens.

16. **Polyporus tabacinus** Montagne, *Ann. Sci. Nat.*, ser. 2, vol. 3, p. 349, 1835. (Figs. 19, 20.)

*Polyporus microcyclus* Lev., *Ann. Sci. Nat.*, ser. 3, vol. 2, p. 188, 1844.

*Polystictus tabacinus* (Mont.) Fr., *Nov. Symb.*, p. 93, 1851.

*Polyporus xerampelinus* Kalch., *Grev.*, vol. 4, p. 72, 1876.

*Polystictus microcyclus* (Lev.) Sacc., *Syll. Fung.*, vol. 6, p. 227, 1888.

*P. xerampelinus* (Kalch.) Sacc., *l.c.*, p. 282.

*Inonotus corrosus* Murr., *Bull. Torr. Bot. Cl.*, vol. 31, p. 598, 1904.

Pileus applanate, dimidiate, imbricate, 2-3 x 2-6 cm. x 1-3 mm., incurved and rigid when dry; surface tobacco brown, concentrically zoned, imperfectly radially striate, finely silky- tomentose, margins yellowish or tawny; context umber, firm, 0.5-1.5 mm. thick; tubes even, round, umber, concolorous with context, 1-2 mm. long, 7-8 to mm., dissepiments entire, thin; setae abundant, deep chestnut, acuminately pointed; spores obvate or subglobose, 2.5 x 1.5 mmm., hyaline, smooth, rare.

Habitat: On dead logs in the forest.

Day's Bay, Wellington; 1908; *A. H. Cockayne!*

Weraroa, Wellington; July 1919; *G.H.C.*: May 1923; *J. C. Neill—G.H.C.*

Face p. 240.

Fig. 1.

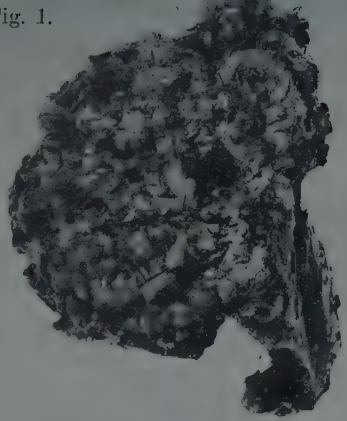


Fig. 2.

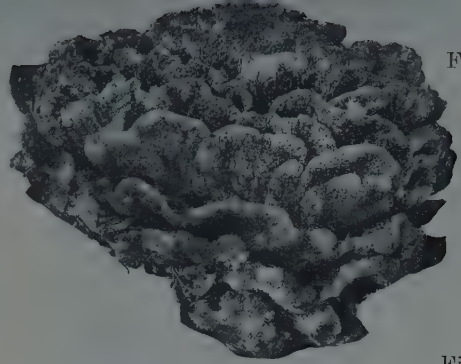


Fig. 4.

Fig. 3.

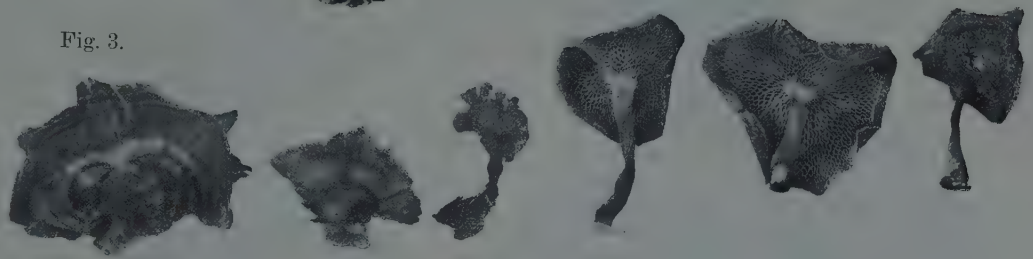


Fig. 1.—*Polyporus Colensoi*, x 1/2. Note the compound pileoli on a common stipe. In certain Australian forms the pileoli are much larger, more loosely aggregated, and attached to a lateral stipe.

Fig. 2.—*Polyporus rosettus*, x 1/3. Compound pileus. Australian specimen kindly loaned by Dr. J. B. Cleland, Adelaide.

Fig. 3.—*Polyporus oblectans*, natural size. Double plant on the left, plant with lateral stipe in the centre, immature plant on the right.

Fig. 4.—*Polyporus arcularius*, x 2/3. The central stipe and hexagonal tubes are well shown in this photograph.

Fig. 5.

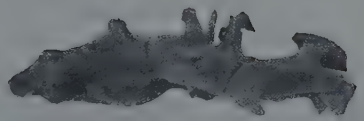
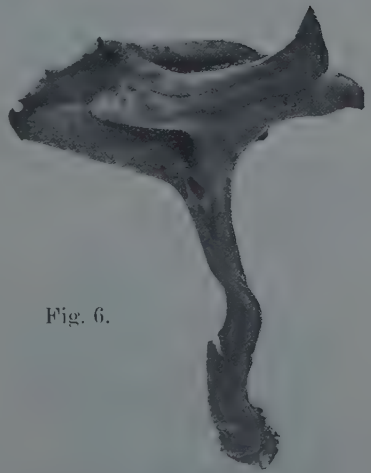


Fig. 6.



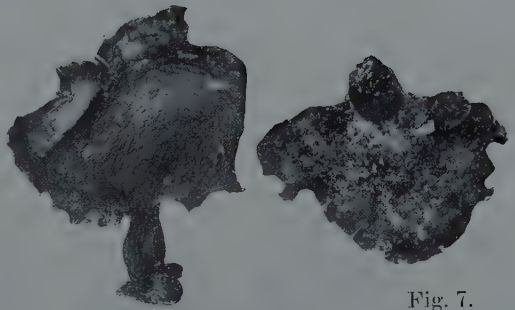


Fig. 7.

Fig. 8.

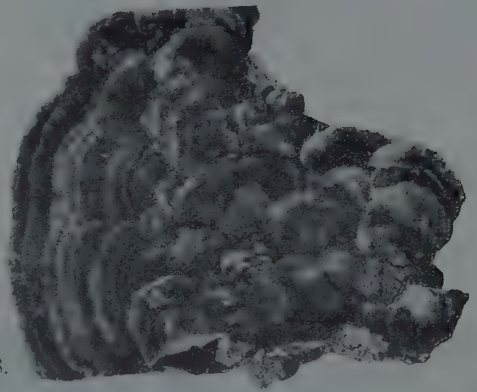


Fig. 5.—*Polyporus catervatus*, x 3. Several pilei aggregated together. Note the short stipes, sulcate exterior and pendent habit.

Fig. 6.—*Polyporus melanopus*, x 2/3. Note the prominent central stipe of this specimen.

Fig. 7.—*Polyporus melanopus*, x 1/3. Surface and ventral views of laterally stipitate plants. Black cuticular covering to the stipe shown on plant on the right.

Fig. 8.—*Polyporus hirsutus*, natural size. Note the strongly zoned hirsute surface of the pileus.

Fig. 9.

Fig. 10.

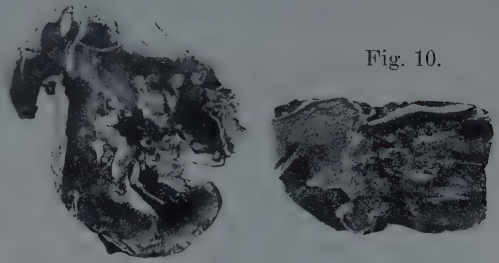


Fig. 11.

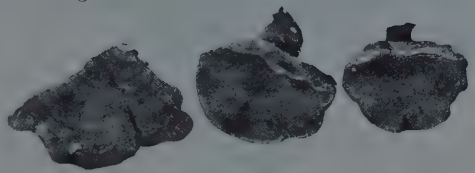


Fig. 12.

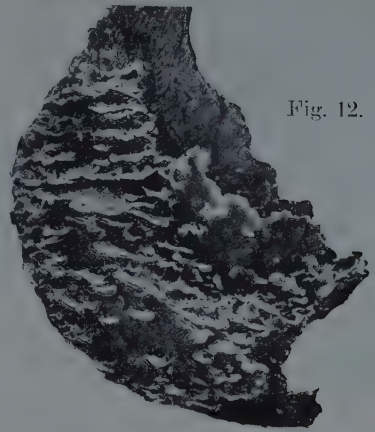


Fig. 9.—*Polyporus versicolor*, x 2/3. Note the strongly zoned pileus and imbricate habit.
Fig. 10.—*Polyporus adustus*, x 1/2. Pileate form on the left, resupinate form on the right.
Fig. 11.—*Polyporus versicolor*, natural size. Gibbous forms; contrast with Fig. 9.
Fig. 12.—*Polyporus dichrous*, x 1/2. On bark of dead *Pinus* log. Note the imbricate habit.

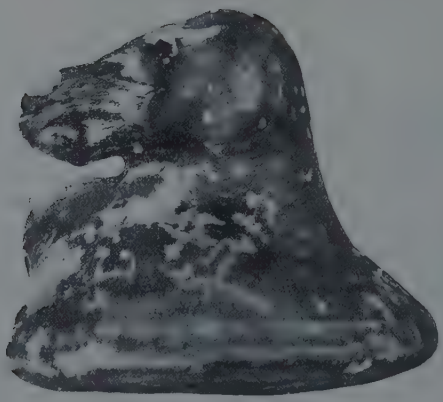


Fig. 13.

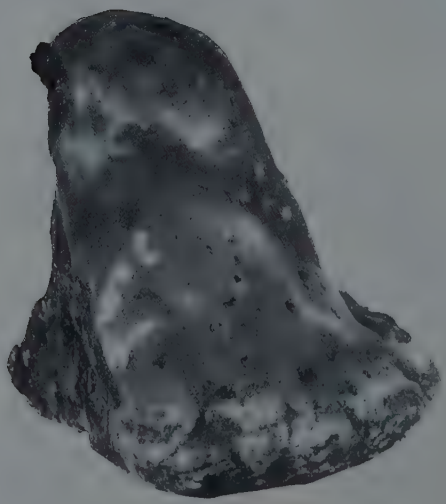


Fig. 14.

FIG. 13.—*Polyporus Eucalyptorum*, x 1/3. Bell-shaped specimen; point of attachment on top left. White areas are where cuticle has been removed by insects.

FIG. 14.—*Polyporus Eucalyptorum*, x 1/4. Ungulate specimen. Point of attachment on top left. Plant flattened where it came in contact with the trunk of the host.

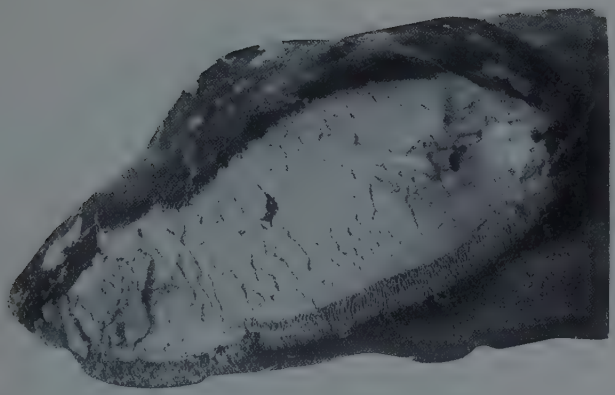


Fig. 15.

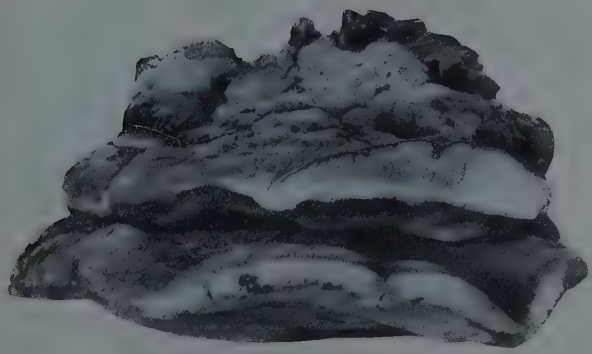


Fig. 16.

Fig. 15.—*Polyporus Eucalyptorum*, x 2/3. Applanate specimen. Showing the white context and separable tube layer.
Fig. 16.—*Polyporus proprius*, x 1/2. Two superposed pilei, upper sectioned to show the thick context and thin tube layer.

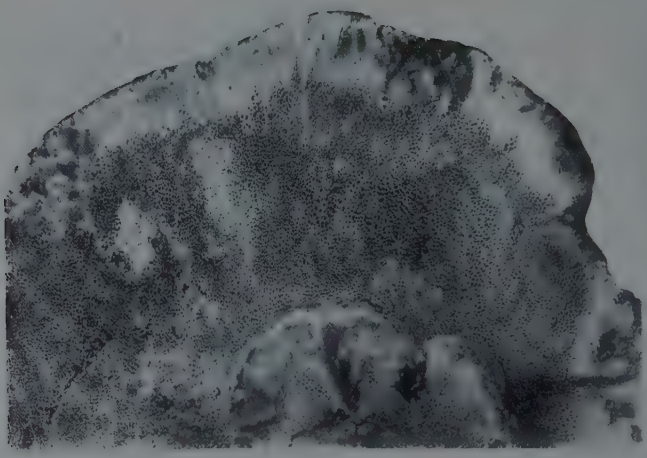


Fig. 17.

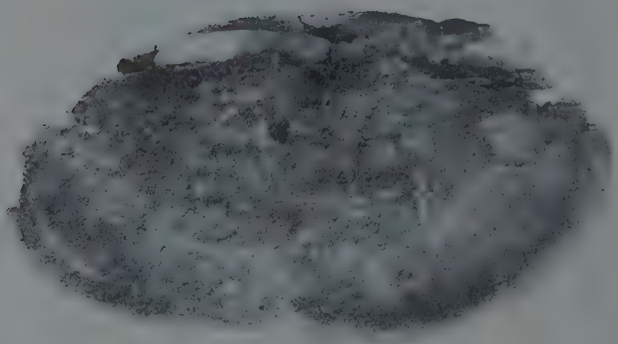


Fig. 18.

Fig. 17.—*Polyporus proprius*, natural size. Ventral surface showing the broad sterile margin and thick walls of the tubes.

Fig. 18.—*Polyporus gilvus*, x 1/2. Surface view showing its roughened nature, applanate shape of pileus, and broad point of attachment.

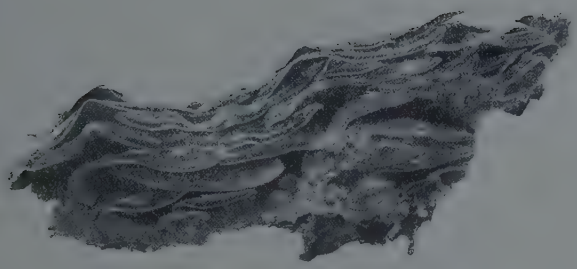


Fig. 19.

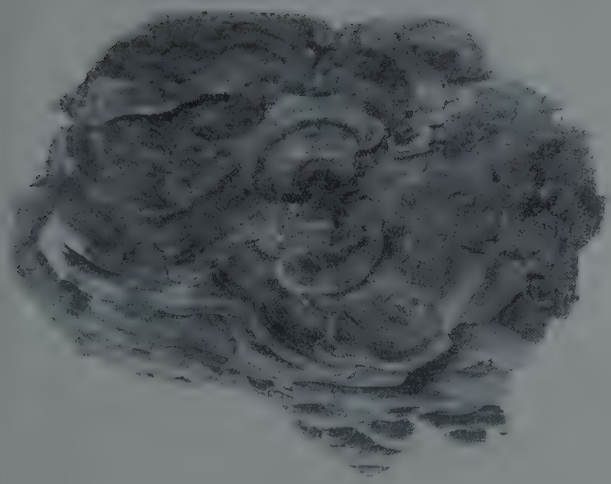


Fig. 20.

Fig. 19.—*Polyporus tabacinus*, x 2/3. Showing the imbricate nature of the pilei.

Fig. 20.—*Polyporus tabacinus*, x 2/3. Surface view showing the strongly zoned surface of the pilei and bright coloured margins.

All photographs taken by H. Drake and the writer conjointly.

Distribution: South America; Africa; East Indies; Australia; New Zealand.

The species is characterized by the tobacco-brown colour of the whole plant, the usually silky zoned pileus, umber context, and abundant setae. Spores have been found attached to basidia in only one collection. These are exceedingly minute, so that one was at first inclined to believe they were immature, but as they agree with detached spores in the same field, they may be considered as being of this size. They are apparently rare, as so few records of their appearance have been published.

17. **Polyporus radiatus** (Sowerby) Fries, *Syst. Myc.*, vol. 1, p. 269, 1821.
*P. cucullatus* Berk. et Curt., *Grev.*, vol. 1, p. 51, 1872.
*P. glomeratus* Peck, *Ann. Rept. N.Y. State Mus.*, vol. 24, p. 78, 1873.
*Inonotus radiatus* (Sow.) Karst., *Rev. Myc.*, vol. 3, p. 19, 1881.
*Polyporus scrobiculatus* Karst., *Medd. Soc. Faun. et Fl. Fenn.*, p. 50, 1883.
*Inodermus radiatus* (Sow.) Quel., *Fl. Myc.*, p. 392, 1888.
*Polystictus radiatus* (Sow.) Sacc., *Syll. Fung.*, vol. 6, p. 247, 1888.
*P. scrobiculatus* (Karst) Sacc., *l.c.*
*Polyporus aureonitens* Pat. et Peck, *Ann. Rept. N.Y. State Mus.*, vol. 42, p. 25, 1889.
*Poria setigera* Peck, *Ibid.*, vol. 51, p. 293, 1898.
*Xanthochrous radiatus* (Sow.) Pat., *Ess. Tax. Hymen.*, p. 100, 1900.
*Polyporus radians* Lloyd, *Myc. Notes*, p. 1186, 1923; *nomen nudum.*

Pileus imbricate, fan-shaped or dimidiate, often resupinate, 1-3 x 2-7 x 0.25-1 cm.; exterior obscurely radially and concentrically striate, usually glabrous, but in young plants finely tomentose, fulvus to deep umber; context thin, 1-2 mm. or less, ferruginous to umber, in old specimens almost black, sometimes obscurely zoned; tubes 2-4 mm. long, cinnamon, angular, 4-5 to mm., dissepiments thin, brittle, often lacerate; cystidia abundant, ventricose, acuminate, chestnut brown; spores subglobose or shortly elliptical, 4-6 x 3-4 mmm., smooth, pallid ferruginous, abundant.

Habitat: On fallen *Nothofagus* spp. trunks in forest.
Queenstown, Otago; December 1919; *G.H.C.*
York Bay, Wellington; June 1922; *E. H. Atkinson!*
Canterbury; February 1881; *T. Kirk!*

Distribution: Britain; Europe; North America; Australia; New Zealand.

The almost glabrous, dark, radically and concentrically striate pileus, dark brown thin context, setae and coloured spores are the characters of the species.

Confusion exists in literature as to the colour of the spores of this species. Lloyd (12, p. 351) states that they are hyaline, and that those plants with coloured spores should be placed under *P. cuticu-*

*laris,* which closely resembles *P. radiatus* in other characters. Murrill (16, p. 90) places the species in *Ionotus,* a "genus" with coloured spores, and describes these as being "luteolus"; Bourdot and Galzin (1, p. 199) state that the spores are "puis brunies dans les tubes . . . en masse: blanches, creme ou blanc jaunatre." In a footnote they remark: "Les spores en masse sur feuilles, ecorces, varient de blanc jaunatre; si elles sont tombees sur un chapeau de *radiatus* humide, elles se teignent en jaune ou fauve, ce qui explique qu'il y ait souvent des spores colorees, a l'interieur des tubes." Rea (17, p. 586) records them as white. Yet numerous genera in the family have been based on the colour of the spores!

Doctors Weir and Lloyd have both determined collections forwarded to them as being *P. radiatus,* despite the coloured spores; so the writer is apparently justified in considering the collections listed are of *P. radiatus,* and the spores coloured.

Cleland and Cheel (4, p. 535) doubtfully record the presence of the species in Australia on one plant doubtfully identified as this species by Lloyd. Cooke (5, p. 146) also records it from Australia.

These last three species form a small natural group characterized by the deeply coloured context, tough nature of the pileus, and presence of ventricose setae.

## LITTLE KNOWN, DOUBTFUL AND EXCLUDED SPECIES.

Between the 'Forties and 'Eighties of last century numerous fungi were collected by such early botanists as Colenso, Hooker, Travers, Lindsay and Kirk. These were for the most part despatched to herbaria abroad—chiefly Kew—where they were named, and new species "described." As these collectors were not Mycologists but merely collected any fungi sufficiently large to attract their attention, it will be seen that the majority of their collections consisted of Polypores, Agarics and similar large species. They were forwarded, without field notes, usually imperfectly preserved, and mostly without selection to give the range of characters, etc.—most, in fact, being single specimens—to Mycologists of the period who for the most part entertained a fixed belief that any species from a new country must necessarily be new, and in addition were invariably overworked, few at that period possessing a knowledge of systematic Mycology. Consequently the greater part of these earlier collections were misdetermined, and many named as new species. Lists were published—chiefly by Colenso—in earlier numbers of this periodical. Types were sometimes kept at Kew, but many have disappeared subsequently; and as the descriptions drawn up at that period were so scanty as to be worthless for diagnosis, and seldom accompanied by an illustration, it is obvious that determination of most of these early records is a matter of conjecture. Unwittingly, therefore, these earlier workers have set the most difficult problem that any systematist is confronted with—the determination without adequate material of the species recorded for his region.

The fallacy of incorporating these dubious records in the flora of this Dominion, in the absence of authentic specimens, is obvious. It

is made more apparent by the fact that of all these earlier records, not one specimen exists in New Zealand to-day. Mr. W. R. B. Oliver, at the request of the writer, has searched through the late Rev. W. Colenso's herbarium, kept at the Dominion Museum, and reports the total absence of any mycological specimens. He further stated that even were specimens present, they would have been valueless, for in this herbarium plants were tied in packages bearing a number only—no name, date or locality reference being appended. The numbers may at one time have had a value, as there may possibly have been in existence a list, but this is now wanting.

The following have been recorded by various workers as having been collected in New Zealand, but in the absence of authentic specimens, the writer is not disposed to accept their validity. Doubtless further collections will come to hand, from time to time, when they will be dealt with in subsequent papers.

(*a*) *Polyporus atristrigosus* Lloyd, *Myc. Notes,* p. 731, 1917. Recorded by Lloyd (*Letter 66,* p. 6, 1917) as being collected by W. A. Scarfe.

(*b*) *P. aureo-fulvus* Lloyd, *Myc. Notes,* p. 1108, 1922. This will be considered in a subsequent paper under *Trametes,* for it belongs to this genus as now defined.

(*c*) *P. borealis* Fries, *Syst. Myc.,* vol. 1, p. 366, 1821. Recorded by Massee (14) as occurring here.

(*d*) *P. cinnabarinus* Fries, *Syst. Myc.,* vol. 1, p. 371, 1821. Recorded by Massee (14) as *Polystictus,* from New Zealand. It is an abundant species, and will be considered under *Trametes,* to which genus it belongs.

(*e*) *P. citreus* Berk., *Jour. Linn. Soc.,* vol. 13, p, 162. Recorded by Colenso (*Trans. N.Z. Inst.,* vol. 28, p. 614, 1895) as *Polystictus,* as being collected by him in Hawke's Bay. It is a synonym of *Poria vaporaria* Fr.

(*f*) *Polystictus conchifer* (Schw.) Cke., *Grev.,* vol. 14, p. 79, 1886. Recorded by Miss Wakefield (18, p. 364) as being collected at Rotorua by Mr. W. N. Cheesman.

(*g*) *Polyporus dictyopus* Montagne, *Ann. Sci. Nat.,* ser. 2, vol. 3, No. 14, 1835. Recorded by Lloyd (*Myc. Notes,* p. 1296, 1924) as having been collected by Jas. Mitchell. Lloyd has also determined for the writer a collection as above; but this was typically *P. melanopus.*

(*h*) *P. diffisus* Berkley, *Fl. N.Z.,* vol. 2, p. 180, 1855. An endemic species described by Berkeley from specimens forwarded to Kew by Colenso. Massee (14) states that there are no specimens at Kew, but that the description shows it should be placed under *Poria.* As no specimens exist, and as the description is too imperfect to allow of its being recognised if again encountered, the name should be removed from literature.

(*i*) *P. Drummondii* Klotzch, *Linnaea,* vol. 8, p. 487, 1833. Recorded by Colenso (*Trans. N.Z. Inst.,* vol. 25, p. 340, 1892) as being collected by himself. It is probably a misdetermination of *P. hirsutus.*

(*j*) *P. exiguus* Colenso, *Trans. N.Z. Inst.,* vol. 17, p. 266, 1884. *P. exiguus* Cke., *Grev.,* vol. 15, p. 23, 1887. Recorded as a new species by Colenso, but unaccompanied by a valid description, consequently

a *nomen nudum*. Therefore, whether Cooke's specimen is a valid species or not, it cannot be listed under this specific name.

(*k*) *P. grammocephalus* Berkeley, Hook. *Lond. Jour. Bot.*, vol. 1, p. 148, 1842. Collected and forwarded by Colenso to Kew, where it was described by Berkeley. A subsequent record was published by Colenso in *Trans. N.Z. Inst.*, vol. 23, p. 393, 1890, but whether on a diagnosis made by himself or Kew authorities is not stated.

(*l*) *P. hypomelanus* Berkeley in Herb.; Cke. *Grev.*, vol. 15, p. 51, 1886. Known only from the type, now at Kew, collected by Colenso.

(*m*) *Polystictus imbricatus* Lloyd, *Myc. Notes*, p. 791, 1918. Recorded by Lloyd (*Myc. Notes*, p. 1123, 1922) as being collected by Miss H. K. Dalrymple and (*l.c.*, p. 1127) by W. A. Scarfe. *Polyporus imbricatus* Fr. antedates this by many years, so that even if the species is a valid one (which it is impossible to judge from the scanty and incomplete description given by Lloyd) the specific name *imbricatus* cannot be used. It is interesting to note that Rea (17, p. 582) gives *P. sulphureus* (also recorded from New Zealand) as a synonym of *Polyporus imbricatus*.

(*n*) *Polyporus iodinus* Montagne, *Ann. Sci. Nat.*, ser. 2, vol. 16, p. 108, 1841. Recorded by Lloyd (*Letter 47*, p. 3, 1913) as *Polystictus*, as being collected by S. Duncan. Most certainly a misdetermination of *P. tabacinus* Mont.

(*o*) *P. lactus* Cooke, *Grev.*, vol. 12, p. 16, 1883. *P. lactus* Mass., *Trans. N.Z. Inst.*, vol. 39, p. 6, 1906. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 23, p. 393, 1890) as being collected in Hawke's Bay. Probably a misdetermination of *P. Berkeleyi*.

(*p*) *P. lentus* Berkeley, *Outl. Brit. Fung.*, p. 237, 1860. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 19, p. 303, 1886) as being collected by himself in Hawke's Bay. A misdetermination of *P. arcularius*.

(*q*) *Polystictus lilacino-gilvus* (Berk.) Cke., *Grev.*, vol. 14, p. 82, 1886. Recorded by Miss Wakefield (18, p. 364) as being collected in New Zealand. According to Lloyd (11, p. 226) this is a *Trametes*.

(*r*) *Polystictus luteo-olivaceus* (B. et Br.) Cooke, *Grev.*, vol. 14, p. 86, 1886. Recorded by Miss Wakefield (18, p. 365) as being collected by Cheesman at Mamaku, near Rotorua.

(*s*) *Polyporus nivicolor* Colenso, *Trans. N.Z. Inst.*, vol. 16, p. 361, 1883. According to Lloyd (10, p. 147) this is a synonym of *P. phlebophorus* Berk.

(*t*) *P. occidentalis* Klotzsch, *Linnaea*, vol. 8, p. 486, 1833. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 28, p. 614, 1895) as being collected by himself. Also recorded by Lloyd (*Myc. Notes*, p. 1320, 1924) as being collected at Napier by H. Hill.

(*u*) *Polystictus ochraceus* (Pers.) Lloyd, *Letter 65*, p. 11, 1917, *nomen nudum*. Recorded by Lloyd (*l.c.*) as being collected by W. E. Barker. As the name was unaccompanied by a description, it must be removed from the literature.

(*v*) *Polystictus pergamenus* Fries, *Epi.*, p. 480, 1838. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 19, p. 308, 1886) as being collected by himself in Hawke's Bay.

(*w*) *Polyporus petaloides* Fries, *Hym. Eur.*, p. 536, 1874. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 19, p. 303, 1886) as being collected by himself.

(*x*) *P. phelebophorus* Berkeley, *Fl. N.Z.*, vol. 2, p. 177, 1855. An endemic species described by Berkeley from material forwarded to Kew by Colenso. Later collected and renamed as *P. nivicolor* by Colenso.

(*y*) *P. picipes* Fries, *Syst. Myc.*, vol. 1, p. 353, 1821. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 19, p. 303, 1886) as being collected by himself. Probably a misdetermination of *P. melanopus*.

(*z*) *Polystictus pinisitus* Fries, *Elench. Fung.*, p. 95, 1828. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 28, p. 614, 1895) as being collected by himself. Lloyd (*Myc. Notes, Poly. Issue*, No. 2, p. 27, 1909) states that this record is based on an error of determination.

(*aa*) *Polyporus plebius* Berkeley, *Fl. N.Z.*, vol. 2, p. 179, 1855. Named by Berkeley from material collected in New Zealand. According to Bresadola (2, p. 235), "P. plebejus Berk. typus ex New Zealand amplius non adest. Subtypus ex Himalaja, qui cum diagnosi berkeleyana typi bene convenit, est cum *Fomite luzonensi* Murr. et *F. semitosto* B. identicus. *Polyporus plebejus* Berk. Fungi Bras. No. 15, 69, 100 est *Fomes supinus* Sw."

Lloyd (11, p. 227) records it under *Trametes plebia*, and gives a description drawn up from the Himalayan specimens. As Berkeley's description is too inadequate to use for diagnostic purposes, and considering Bresadola's remarks, the writer believes the name should be removed from the literature.

(*bb*) *Polyporus rhipidium* Berkeley, Hook. *Jour. Bot.*, vol. 6, p. 319, 1847. *Favolus rhipidium* (Berk.) Sacc., *Syll. Fung.*, vol. 6, p. 397, 1888. Lloyd (8, p. 24) records this from New Zealand as being among the plants of this species at Kew.

(*cc*) *P. rigidus* Lloyd, *Myc. Notes*, p. 1319, 1924, *nomen nudum*. Published (*l.c.*, p. 1334) as *P. gilvo-rigidus* Lloyd, n. sp. By the writer it is considered a synonym of *P. givus*. In any case the name *rigidus* is preoccupied = *P. rigidus* Lev. 1844.

(*dd*) *Polystictus sanguineus* Fries, *Nov. Symb.*, p. 75, 1881. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 23, p. 395, 1890) as having been collected in New Zealand. It is a synonym of *Trametes cinnabarina* Fr.

(*ee*) *Polyporus scruposus* Fries, *Epi.*, p. 473, 1838. Recorded for New Zealand by Massee (14). This is a synonym of *P. gilvus*.

(*ff*) *Polyporus scutiger* Kalchbrenner. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 23, p. 393, 1890) as being collected by himself. Lloyd (10, p 162) states that the name was changed by Fries to *P. Kalchbrenneri*, and was based on a small specimen of *P. tomentosus*.

(*gg*) *Polystictus sector* Fries, *Epi.*, p. 480, 1838. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 23, p. 395, 1890) as being collected by himself.

(*hh*) *Polyporus setiger* Cooke, *Grev.*, vol. 19, p. 1, 1890. Known only from the type specimen at Kew. Probably *P. scutiger* is a misspelling of this name. Lloyd states (12, p. 375) that *P. atrostrigosus*, also from New Zealand, but known from scanty material, is very similar, and probably the same species. He records a collection (*Letter 68*, p. 7, 1919) from W. A. Scarfe.

(*ii*) *P. squamosus* Fries, *Syst. Myc.*, vol. 1, p. 343, 1821. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 23, p. 393, 1890) as being collected by himself.

(*jj*) *P. sulphureus* Fries. *Syst. Myc.*, vol. 1, p. 357, 1821. Lloyd records this species (*Myc. Notes*, p. 1189, 1923) as being collected by W. A. Scarfe.

(*kk*) *Polystictus trizonatus* Cooke, *Grev.*, vol. 12, p. 17, 1883. Lloyd (*Letter 66*, p. 6, 1917) records this as being collected by W. A. Scarfe. It is a synonym of *Polyporus versicolor.*

(*ll*) *Polystictus velutinus* Fries. Massee (14) records this from New Zealand. It is most probably a misdetermination of *Polyporus versicolor.*

(*mm*) *Polyporus vulgaris* Fries, *Syst. Myc.*, vol. 1, p. 381, 1821. Recorded by Colenso (*Trans. N.Z. Inst.*, vol. 26, p. 321, 1893) as being collected by himself. It is a *Poria.*

(*nn*) *P. xerophyllus* Berkeley, *Fl. N.Z.*, vol. 2, p. 178, 1855. Known only from a single specimen at Kew, collected in New Zealand by Colenso.

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## COMBINED FUNGUS AND HOST INDEX TO THE GENERA FOMES AND POLYPORUS.

All synonyms are in italics; the page number on which is a description of the species in question, or host of that species, is also italicized.


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